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The objective of this dissertation is to examine the fundamental geographic patterns regarding the spatial distribution of specific Aging in Place (AIP) and Aging in Community (AIC) opportunities in the United States by county, focusing on the characteristics of the workforce that provide these services. Secondly, this research aims to determine what the key determinants or predictor variables that best explain this spatial distribution. This examination will investigate the geographical link between Facility-Based Services (FBS) and Home and Community-Based Services (HCBS) and their relationship to the older adult population. It is hypothesized that certain socio-economic and demographic variables that gauge culture, social capital, and prosperity will be instrumental in describing the geographic inventory of the Long-Term Care workforce and that specific establishments and initiatives dedicated to the Continuum of Long-Term Care are disproportionately located and clustered in these geographic areas. Specifically, it is hypothesized that the geography of Facility-Based and Home and Community-Based Services will vary, and access to Long-Term Care will be unequal. The analysis revealed that Long-Term Care employment and Continuum of Care establishments are not evenly distributed throughout the United States, greatly influencing an individual's ability to Age in Community. Urban counties, with higher population densities and elevated levels of social capital provide more HCBS and innovative Long-Term Care (LTC) options. Access barriers are accentuated in rural and less affluent geographies, often making institutionalized Skilled Nursing Homes the only available form of care.

THE GEOGRAPHY OF THE LONG-TERM CARE CONTINUUM PRODUCTION SYSTEM BY COUNTY

by

Jason Corley Miller

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Approved by

Dr. Keith Debbage
Committee Chair

To my Aunt, Elizabeth Brawley

For my love, Sarah

For my parents, Mary and Ed

For Walker, Monica, Lindsey, and Evan

For Regs and Shark

APPROVAL PAGE

This dissertation, written by Jason Corley Miller, has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

Committee Chair _____

Committee Members _____

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Date of Acceptance by Committee

_____

Date of Final Oral Examination

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CHAPTER I

INTRODUCTION

The purpose of this dissertation is to identify and study the central geographic themes affecting the spatial distribution of Aging in Place (AIP) and Aging in Community (AIC) opportunity in the United States, while highlighting the requisite relationship between AIP, AIC, and Long-Term Care (LTC) provision. LTC occurs along a continuum that is chiefly comprised of Facility-Based Services (FBS) and Home and Community-Based Services (HCBS). FBS represent a broad spectrum of residential environments that provide varying levels of care; common types of FBS include Continuing Care Retirement Communities (CCRCs), Assisted Living, (AL), and Skilled Nursing Facilities (SNFs) (Tenenbaum, 2010). HCBS are support services designed to keep individuals in their home as long as they want to remain by offering an appropriate level of care. This dissertation will explore the Continuum of Care supply-side production system and will investigate the geographic link between FBS and HCBS and their relationship to an aging U.S. population.

Definitions of AIP have evolved from a focus primarily on older adults' desire to remain in their homes as they age, to encompass broader initiatives emphasizing society's responsibility to provide options and tools for older adults to determine where they age. Aging in Community represents an expansion of the AIP concept and illustrates a paradigm shift from describing an individual's desire to age in a familiar environment to

a theme promoting a self-determined environment. A self-determined environment requires the availability of LTC resources, which include institutional and non-institutional care facilities, as well as the opportunity to receive care at home with the assistance of HCBS (Ball et al., 2004; Bernard, Zimmerman and Eckert, 2001). Services and resources found at the community or neighborhood level are driven by politics, economics, and social movements and demonstrate society's structural influence on aging and environment. The presence of AIP and LTC resources illustrates a community's commitment to protect the aging population and facilitate individuals remaining in a self-determined environment (Lee, 2008). The growth of the AIP model towards AIC and a self-determined environment provides the conceptual framework for this dissertation.

Studies concerning the geography of the LTC workforce and its role in promoting AIP are urgently needed to assist researchers and policy makers with challenges resulting from population aging and increasing demands for LTC in the United States. The aging of the U.S. population has tremendous implications for the LTC industry, both in terms of providing products and services to a growing number of older adults and employing an older workforce. An unprecedented demand for health services will coincide with the retirement of large numbers of LTC workers, making shortages likely (IOM, 2008). Additionally, demographic trends forecast a substantial decline in the availability of informal family caregivers. The overwhelming majority of LTC is provided in the home by informal family caregivers. Informal care is a significant factor in delaying institutional care and increasing AIP opportunity. This investigation will identify

geographies with pronounced care gaps, resulting from a shortage of both formal and informal caregivers.

Although establishments providing LTC include professional and paraprofessional job occupations, care is mostly provided by paraprofessionals or direct care workers: certified nursing assistants, home health aides, and personal care aides. Physicians, nurse practitioners, and registered nurses are licensed professionals but comprise less than ten percent of LTC employment (BLS, 2014). Direct Care workers primarily engage in delivering assistance with Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). ADL tasks mainly include administering medications, transportation, bathing, assistance with dressing, and eating. IADL assistance focus more on independent living such as managing finances, preparing meals, shopping, and housework. The direct care workforce represents over 30 percent of the nation's overall health care workforce and is one of the fastest growing occupations in the country. The workforce is projected to reach five million by 2020 and become the nation's largest occupational group (PHI, 2014). Attracting large numbers of competent workers requires a competitiveness in the job market. The median hourly wage for all direct care workers in 2012 was $10.63 (PHI, 2014), presenting economic challenges to employees and hampering efforts to grow a capable direct care workforce.

Research focused on the geographic distribution of AIP and LTC in the United States is limited, particularly from the supply-side perspective, providing a need for this examination. Access to the Continuum of Care is an essential component of AIP opportunity. This dissertation will investigate how geography affects the supply of Long-

Term Care establishments and employment that support AIP at the county level, the most commonly cited geographic market of Long-Term Care (Bowblis, 2012). Counties within Metropolitan Statistical Areas (MSAs) are investigated in detail, with particular attention centered on the 436 counties that make up Large MSAs with populations over one million residents.

This study will spatially explore LTC provision by employing key concepts found in Geography and Gerontology. Empirical methods are well suited to analyze the spatial distribution of health care resources (Cheng, 2010) and will identify the relationship between service supply and demand. Critical quantitative analysis and mapping techniques will illustrate themes of access and LTC resource utilization.

A critical perspective, focusing on geographic concepts influencing the supply of AIP opportunity, provides a theoretical platform to examine issues of equality/inequality and exclusion/inclusion (Kearns and Moon, 2002). The hypothesis of this dissertation is that certain population measures, socio-economic factors, and environmental characteristics that gauge culture, social capital, and prosperity will be instrumental in describing the geographic inventory of LTC and that specific LTC establishments and initiatives are disproportionally located and clustered in these specific geographic areas. A more detailed research hypothesis is presented in chapter three. The following chapter will provide a review of literature pertinent to the geography of the Long-Term Care production system and AIP opportunity.

CHAPTER II

LITERATURE REVIEW

This Literature Review will examine the conceptual evolution of Aging in Place (AIP) and its relationship to the Long-Term Care Continuum, giving particular attention to geographic principles affecting AIP opportunity through Long-Term Care (LTC) service provision. Theoretical and empirical research investigating AIP is multidisciplinary–prominent in geography, gerontology, and other academic disciplines. This literature review will observe the progression of the AIP concept from its origins, highlighting specific contributions from geographers, who work within geographies of aging, and the budding interdisciplinary field of geographical gerontology.

A specific component of this review will illustrate the expansion of the AIP model towards Aging in Community (AIC), a theme that promotes a self-determined environment which accentuates the relationship between LTC goods and services found within the community and provides the conceptual foundation for this dissertation. The final part of this literature review will examine the geography of continuum of care from a supply side or employment perspective by describing the unique and complex forms of healthcare, housing, and social services within the continuum and examining theoretical studies accentuating geographic principles that influence continuum of care employment within the United States.

Central to this dissertation is the idea that AIP relies on LTC Continuum resource accessibility, a process influenced by individuals and communities. Micro-scale research focuses on the relationship between health and place at the individual or personal level; individual factors include social status, economic status, and personal beliefs. Macro-level research, a major focus of this dissertation, examines the spatial distribution of LTC products and services by investigating community influence on care provision through political pressure, public policy, and the built environment. A geographic method of empirical analysis shows great potential in exploring new theory by linking social, cultural, and political influences on policy and services along the continuum of care. An investigation into the many dimensions and meanings of accessibility will serve to better explain the geographical relationship between LTC needs and services. Demand for AIP resources is increasing, exacerbating an already pronounced workforce shortage, accentuating supply-side aspects of AIP. The literature examined in this chapter provides the framework to critically address specific research questions in the following chapter of this dissertation.

2.1 Towards a Critical Geography of AIP

AIP is a valuable component of theories focused on aging and the environment, exploring the relationship between an individual's care needs and residential setting. Scholarly research and theory strive to elucidate why certain residential environments better serve the needs and preferences of older residents (Golant, 2003; Lawton, 1991). Originating from studies of environmental impacts on older adults performed by social

psychologists, Lawton (1983, 1998) addresses the complex relationship that exists between older adults and the pressures they face due to incompatible environments.

The Ecological (or competence press) Theory of Aging argues that older adults' physical and emotional well-being is governed by the demands and stressors of their external environment as well as their degree of competence, measured by their biological and cognitive skills (Lawton, 1998; Golant, 2011). The Ecological Theory of Aging (Lawton and Nahemow, 1973) provides a theoretical foundation for examining the relationship between older adults, the environment, and the aging process (Golant, 2003). A prevailing theme in theoretical development of older adults and the aging process is that place matters (Lee, 2008).

A complementing model, The Person Environment Congruence Model, illustrates that positive outcomes are most common when an individual's competencies are congruent with the environment. On the other hand, incongruence forces individuals to use adaptive measures to achieve balance (Kahana et al., 2003; Golant, 2011). Older adults are theorized as being in a residential comfort zone when they are able to negotiate their environment relatively well while experiencing fond memories and feelings about where they live. Residential mastery zones are places where individuals feel in complete control and fully competent (Golant, 2011). Residential Normalcy (Golant, 2011) can occur in various residential settings and may not always be best achieved at home. Often a Service Enriched Housing (SEH) or Facility-Based Services (FBS) alternative is most effective in achieving a residential comfort zone.

Continuity Theory (Atchley, 1989) utilizes principles of the life course perspective to posit that adults strive to maintain their physical, mental, social, and emotional health and status as they age. Atchley (1989) speaks of two types of continuity: internal and external. Internal continuity addresses an individual's attitude, personal preferences, and interests. External continuity is shaped by personal relationships, social activities, and engagement within the community. This theory received criticism for its narrowness and was argued to apply only to those experiencing "normal aging" (Becker, 1993). Continuity Theory has expanded to account for those living in institutional spaces and describes how they use the built environment and social interactions to maintain their identity and connection to their pre–institutionalization self (Troll and Skaff, 1997).

The successful aging model, put forward by Rowe and Kahn (1997), has garnered attention in recent years as a comprehensive method of evaluating effective AIP strategies. According to these authors, three important components highlight successful aging: avoiding disease and disability, maintaining high cognitive and physical function, and actively engaging with life. Planning and community design studies show that environments can encourage healthy physical activity as well as be an obstruction to physical and emotional fitness. Indoor and outdoor recreation activity facilities present within some communities can serve to promote physical activity and social interaction among residents (Menec, 2003).

The concept of Active Aging was put forward by the World Health Organization (WHO) in 2002 and builds on Rowe and Kahn's (1997) framework of Successful Aging.

These concepts state that quality of life for aging adults is predicated on maintaining physical health, mental health, and a sense of purpose through engagement in life and society (Kristjanson, McDowell, Aylesworth, and Karam, 2003; Menec, 2003). Principles of Active Aging are influencing public policy and LTC products and services. Care environments and services aim to provide settings that support a healthy lifestyle and cognitive stimuli while promoting participation and a self-determined environment (Findlay, 2003; Rowe and Kahn, 1987). The Advantage Initiative is a study that produced a model laying out community indicators designed to enhance the overall health and well-being of older residents. This model depicts five necessary elements of a community that are designed to promote healthy, active aging: financial security, health care, social connections, housing and support services, transportation and safety (Feldman et al., 2003).

Geographical theories addressing AIP and LTC stem from medical geography, specifically the geography of health care, focusing on the distribution, accessibility, utilization, and planning and policy of health care resources (Litva and Eyles, 1995; Kearns, and Joseph, 1993). Medical geography began to shift its research focus to accentuate the importance of place on health and in the 1990s embraced the use of social theories and methods (Andrews and Kearns, 2005; Cutchin, 1999; Dyck, 1999; Kearns and Moon, 2002; Laws, 1993, 1996). Andrews and Evans (2008) provide a detailed comprehensive review of literature pertaining to the geography of health care production, explaining its evolution from medical geography. Additional studies examine the presence of specific goods and services in community care settings (Gesler, 1992), and

address key social and economic forces that influence employment and career movements. Crooks and Andrews (2009) accentuate economic connectivity to explain the spatial distribution of institutional and home-based resources for older adults.

The relationship between medical geography and health care was initially put forward to describe the distribution and supply of medical services over specific geographies (Joseph and Phillips, 1984). Building from these studies, investigations began to more closely consider factors that influence provision such as administrative and political boundaries, local service markets, and regulation (Cloutier-Fisher and Skinner, 2006; Joseph and Chalmers, 1996). The bulk of medical geography has since focused on issues of rationing, equity, and efficiency within health care services and provision and has largely ignored the workers or employment factors (Andrews and Evans, 2008).

A geography of health examines how specific places of care address residents' physical, social, emotional, and spiritual needs (Milligan and Wiles, 2010). Early health geography mainly focused on the geographical distribution of physicians and hospitals. Populations were undifferentiated, and the main method of explanation was ecological modelling (Rosenberg, 2014). Rowles (1983) explains that attachment to place is manifested through physical, social, and psychological mechanisms. The maturation of health geography shows both theoretical and empirical lines of inquiry, exhibiting increasing emphasis on the relationship between older adults and their residential environments (Golant, 1972; Rowles, 1983; Warnes, 1982). Rosenberg and Everitt (2001) describe two conflicting ideologies regarding the relationship between the living environments of older adults and the rest of society. One embraces the notion of

integration with society, while the other believes older adults should, and more importantly want to, be segregated from the rest of society. These opposing views provide the foundation for debate on broader issues of equity and efficiency, serving to drive both academic research and public policy concerning service provision.

Research centered on the geographic distribution of health care resources and their accessibility to populations that require those services began to mature in the 1980s. Studies now focus on a wide range of health services, including residential care for aging adults (Cheng et al., 2012). Spatial investigations conducted in the U.K. provide national and specific local inventories of LTC resources and the distribution of Residential Care Facilities (RCFs) (Larder, Day, and Klein, 1986). Specific research addresses the change in the distribution of private and publicly funded care facilities (Phillips and Vincent, 1988). Phillips and Vincent (1988) explore the extensive increase in RCFs in the 1980s, documenting the influence of policy on the proliferation of private facilities.

Studies in Canada highlight service provision and accessibility of elder care resources in rural areas (Joseph and Poyner, 1982; Joseph and Cloutier, 1990). Access to care is a central theme in health geography, and early geographic studies of access were primarily concerned about health care delivery and the influence of distance decay on health care utilization. Distance is categorized and measured in different ways: map distance, road distance, socio-cultural distance, and economic distance affect care delivery (Cheng, 2010).

Physical distance, however, was not seen to be as important as mobility or the ability of people to maneuver their environment. Cheng (2010) investigates the spatial

distribution of older adults and residential care products and services in Beijing, China. Examining the geographical relationship between service needs and care resources is important to identify factors that affect access to care. Cheng (2010) highlights that care supply is unevenly distributed and often does not match community need and explains how socio-economic, cultural, and geographic factors influence care access.

As geographers realized the limitations of distance, research began to inspect how non-spatial variables interacted with distance to affect health care accessibility and utilization (Meade, Florin, and Gesler, 1988). Rosenberg (1983) argues that access exists in two distinct components: economic and physical access. Economic access, or the ability to purchase health care, is argued to influence health care provision more than physical access, or the distance separating users form the care services they require. Further geographic analysis of access has produced multiple definitions, but they all purport that social, economic, and cultural factors along with geographical factors affect access (Joseph and Phillips, 1984).

Rosenberg (2014) examines neighborhoods and their influence on the health and access to care for residents. There is wide debate concerning the proper methods of geographically defining neighborhoods and determining their part, along with individual factors, in explaining health care access. Health geography and literature focusing on themes of environmental justice are closely aligned by efforts to discover the influence of individual and area socio-economic characteristics on health and access to adequate care (Rosenberg, 2014).

Early geographical studies interested in aging largely focused on where older adults lived (Golant, 1972) and how they interacted with the space around them (Rowles, 1983). More recently, four specific progress reports published in "Progress in Human Geography" provide detailed accounts of the maturation of this field of study (Harper and Laws, 1995; Rowles, 1986; Warnes, 1981; 1990). In the first progress report, Warnes (1981) focuses his research on spatially investigating populations of older people, their movement, and the corresponding services designed for their accommodation. Warnes (1981) provides a line of inquiry that promotes a geographical contribution or flow of geographically based principles to gerontology.

In a response to this report, Rowles (1986) accentuates the relationship between older adults and their many environments, calling for research addressing the importance of place and memories and their relationship to individuals' concept of home. The third report (Warnes, 1990) argues that geographers needed to focus on the specific needs of older people and take a step back from theories rooted in human geography that are primarily concerned with the nature of place. Harper and Laws (1995) provide the fourth comprehensive report and put forward an argument that theoretical and methodological concepts derived from the cultural turn in human geography needed to be more prominent in geographical gerontology. This avenue of inquiry was more in line with Rowles (1986) and was meant to caution against empiricism dominated by positivistic methods, instead inviting further research concerning the underlying social processes that impact older persons.

Almost two decades later, as a response to Harper and Laws (1995), Skinner et al (2015) argue that Geographies of Aging, found within contemporary human geography, remain largely unexplored. Although some geographic principles are prevalent in gerontology, where an interdisciplinary spatial turn is well underway (Andrews et al., 2013), only a small portion of complex geographic principles, theories, and methodologies have been employed in aging and gerontological research (Cutchin, 2009).

This investigation will draw from theoretical concepts present within the field of economic geography. Standard Location Theory serves to forecast the profit potential for firms based on production location. Simply, standard theory states that firms choose locations to maximize profit (Newhouse, 1990). Location theory proposes that the geographic distribution of LTC is a manifestation of market forces at work. For AIP services, this theory argues that fewer facilities and services will locate in socio-economically depressed areas, where demand may be less due to low incomes and less insurance (Newhouse, 1990). Merging the principles of location theory with critical approaches will help to better understand the complex location decisions of LTC and AIP establishments.

Critical Geography is an applied way of looking at social issues and emphasizes correcting inequities through action. A critical lens may provide policy makers a vehicle to promote continuum of care accessibility and a better understanding of the relationship between older adults and the built environment (Parr, 2004). Critical theories prominent in allied social sciences are called on to complement a strong geographical empirical foundation. The geography of health care work is fundamentally concerned those who

both receive and provide healthcare, exploring the relationship between social and cultural variables on place and LTC provision.

2.2 Geographical Gerontology

To understand the theoretical framework of AIP, it is important to recognize and review the theoretical concepts and key multidisciplinary reports that have given rise to the concept of Geographical Gerontology. Recent studies devoted to the progress of Geographic Gerontology (Andrews and Phillips, 2005; Andrews et al., 2007; Andrews et al., 2009; Cutchin, 2009; Del Casino 2009) have explored the theoretical evolution and relationship between geography and gerontology. Concepts from geography and gerontology have a history of being employed together to investigate environmental impacts on older adults. Geographic Gerontology (Andrews et al., 2007) describes a spatial way of investigating gerontology and is put forward as a vehicle to develop theory and empirical knowledge, while bridging the gap between the two academic disciplines. This framework centers on the relationship between space, place, and aging and serves to unpack the key subjects that merit investigation and provide direction for future research (Kontos, 2005; Andrews and Kearns, 2005). See (**Figure 2.1)**.

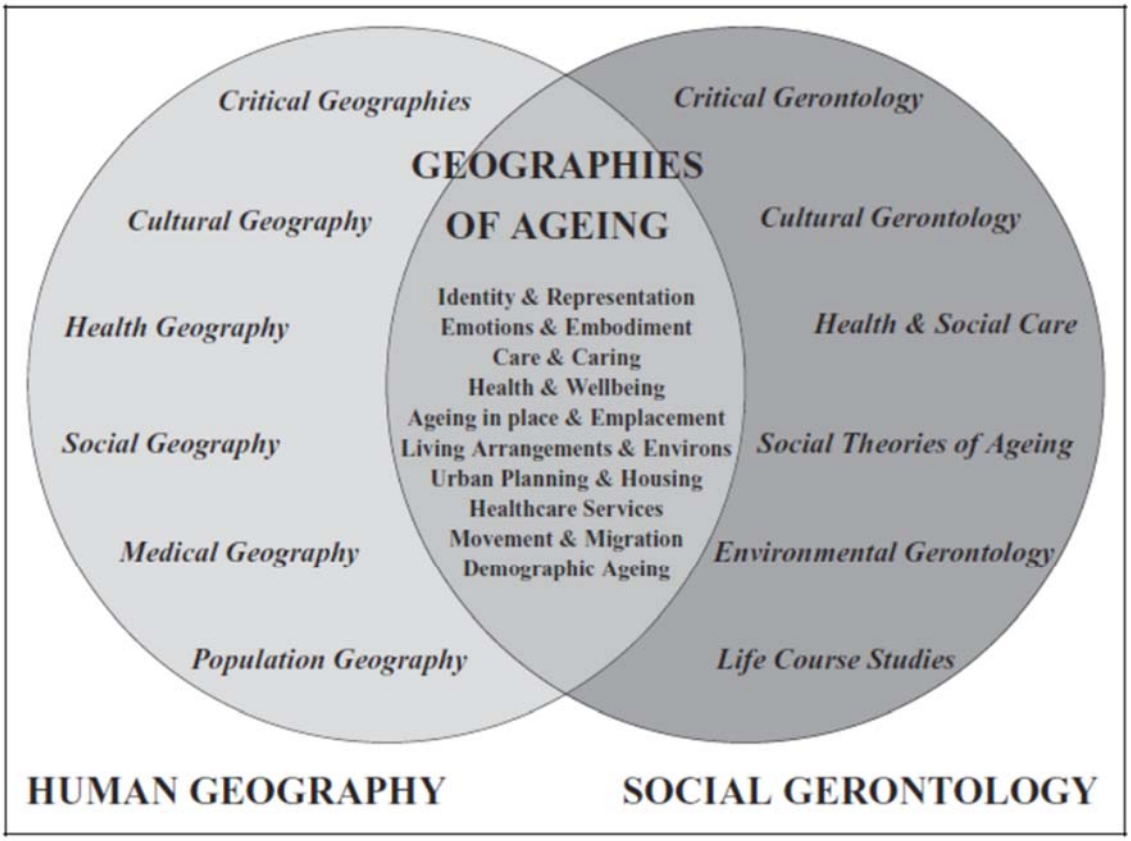

Figure 2.1. Geographies of Ageing. Source: Geographical Gerontology: The Constitution of a Discipline. *Social Science & Medicine.* Andrews et al. (2007).

Andrews et al. (2009) place research themes into five categories so that they can be easily digested. Two of these categories *(emplacement; emotion images and the body*) are largely focused on place and the micro-scale, while three *(population ageing and movement; health and living environments; services, planning and policy)* focus on space and the macro-scale. This framework will be used to review literature concerning the academic roots of Geographic Gerontology and provide the foundation for a more detailed focus on Geographic factors that influence the complex distribution of Continuum of Care employment and supply throughout the United States.

2.2.1 Micro-Scale Research

Place and the micro-scale provide a means to unpack issues such as ageism, gender identity, emotion, and their relationship to place. Micro-scale research has largely embraced the critical turn and seeks to broaden the theoretical and methodological debate (Moody, 2008). ***Emplacement* and *emotion, image and the body*** provide two areas of micro-scale research (Andrews et al., 2009).

Emplacement is an area of Geographical Gerontology that strives to explain the relationship between older people and place from a physical and symbolic perspective (Andrews et al. 2006). Geographers examine the relationship between older adults, health, and place using two early concepts: "sense of place" and "therapeutic landscapes." Sense of Place puts forward socio-economic status as a key factor in determining how places are experienced and more specifically notes that one's place of residence significantly affects the opportunity for a positive or meaningful experience (Kearns and Joseph, 1993). Utilizing the concept of therapeutic landscapes (Gesler, 1992), geographic research has examined the influence that specific characteristics of place—such as the presence of social, physical and cognitive —activities have on the health of older adults. The concept of therapeutic landscapes is first developed by Gesler (1992) and defined by Kearns and Gesler as "places that have achieved lasting reputations for providing physical, mental, and spiritual healing" (Kearns and Gesler, 1998, p.8). Therapeutic Landscapes are subjectively interpreted and experienced and are borne from specific physical, built, and social environments. An understanding of the

physical and socio-cultural meanings of therapeutic landscapes is necessary to plan for and improve future LTC environments.

The built environment, including buildings and surrounding campuses or neighborhoods, are intentionally designed to portray specific cultural values through the architecture, landscaping, and aesthetic presentation (Cutchin, Marshall, and Aldrich, 2010). The appearance of the community is intended to reflect how residents perceive themselves, which is often as members of an elevated socio-economic class (Cutchin, Marshall, and Aldrich, 2010). Upper class, white seniors are aggressively courted by communities by accentuating the power of place and promoting wealth, healthiness, and affluence. Conversely, poor or disadvantaged seniors are absent from view in retirement-community marketing material. Equity is a significant topic for future research, as active and successful aging communities are not available to many less fortunate segments of society (Kuhn, 2008).

In the 1970s, urban geographers started to explore the connection between aging and place, specifically addressing transportation, housing, and mobility of older adults. Golant (1972) investigates the effects of aging on the residential mobility of late middle-aged and older adults. Rowles (1983) examines emotional attachments to place by studying how individuals, who inhabit the same neighborhood, uniquely experience and negotiate the same geography. Rowles and Ohta (1983) investigate the environments of older adults at various geographic scales, paying specific attention to rural areas, the meaning of place, adaptation to place, and interpreting specific memories.

Emotion, image, and the body provides research focused on the emotions of both older adults and society and the imagery used to depict these emotions (Milligan et al., 2005). Critical views are used to examine conflicts between the subjective experience of aging and the emotions that society deems appropriate for older adults. Laws (1993, 1996) offers a theoretical contribution centered on how older adults are represented in advertisements and the media, specifically how the older body is represented and what message is intended, contending that identities and representations of people are embedded and emplaced by societal forces and are spatialized. Harper and Laws (1995) call for a shift away from empirical methods to more critical methods to investigate the geography of aging.

Building on the work of Harper and Laws (1995), McHugh (2000, 2003, 2007) speaks to the significant power of place in imagery to depict specific environments, such as Sun City, as places facilitating active and successful aging. Imagery is manipulated to promote or advertise retirement communities and encourage continued consumption (Lucas, 2004). Symbols are used to represent these communities as places of consumption by providing positive images of aging and avoiding those that depict aging as a period of decline, frailty, or illness (McHugh, 2003).

Space and place play a prominent role in the desirability of Facility or Service Enriched-Housing, influencing the geographic experience of successful aging. Retirement communities portray a message of successful aging through positive images that encourage an active retirement. These images reflect the geographic location and social ideals of the specific retirement community (Laws, 1993). The geographic

experience of aging described in advertisements and literature serves to promote a specific view of later life to inspire continued consumption while recruiting new participants (Lucas, 2004).

2.2.2 Macro-Scale Research

Space and the macro-scale describe the spatial distribution and movements of older people through empiricist and positivist methods (Andrews and Phillips, 2005). The macro-scale provides a clear illustration of older populations and their surrounding social structures and systems (Moore and Rosenberg, 2001). This form of investigation is chiefly comprised of applied research, employing quantitative methods (Andrews and Phillips, 2005; Andrews et al., 2007; Andrews et al., 2009). ***Population aging and movement; health and living environments;*** **and** ***services, planning and policy*** are investigated at the macro-scale.

Population aging and movement is a research field that provides important background evidence concerning demographics and the overall spatial distribution and migration patterns of older persons. Specific areas of study include examinations of retirement migration flows and links between specific populations of older adults and pertinent social services (Bartlett and Phillips, 2000). Life course approaches, which account for an accumulation of experiences over time, and proximity to family are often used to explain the key motivation factors that influence retirement migration (Longino, Perzynski, and Stoller, 2002). Retirement migration, a pattern primarily reserved for the more affluent, will impact the social and economic health of communities through clustering (Andrews et al., 2007) of both wealthy and poor aging adults.

Litwak and Longino (1987) offer a model regarding residential relocation among older adults that describes three types of sequential moves predicated by personal desires and necessity of care. The first move usually stems from a wish to relocate to an area possessing heightened amenities and friendship networks. A second move normally occurs because of declining health and a desire to live near informal caregivers or family. The third and final move takes place when informal caregivers are no longer sufficient and institutional care is required. The Litwak and Longino (1987) model illustrates the most common motives of senior migration and describes common movements through the continuum of care. Economic standing provides heightened choice and access to LTC products and services (Wallace, 1990).

There are many factors that affect an individuals' choice as to where they will receive care. Recent literature speaks to a residential versus community care debate and provides research that supports and criticizes Service Enriched Housing or Facility-Based Services (FBS) (Andrews and Phillips, 2002). Opposition to FBS is chiefly centered on the argument that resident independence suffers from a lack of choice and social interaction. Conversely, there is literature describing the experience of older adults in their homes negatively and supporting FBS communities as places that foster autonomy and an assurance of not being a burden to their families (Andrews and Kearns, 2005; Oldman and Quilgars, 1999). Financial standing and the presence of family caregivers are two influential factors in choosing care. These factors along with geography can be articulated in push-pull models that address the pros and cons of care settings (Longino, Perzynski, and Stoller, 2002).

Push-Pull models (Groger and Kinney, 2007) illustrate the potential positives of a proposed new location to pull someone to a new destination, while articulating that negative aspects of a current living situation may push an individual to move (Krout et al., 2002). Push factors illustrate reasons for choosing a specific community or facility and are comprised of negative aspects of an individual's home environment that make home care provision difficult. A lack of informal family caregivers often makes it challenging for older adults with disabilities to remain at home. Unfavorable geography, home environment, and surrounding community often serve to isolate older adults. Loss of social connectivity and physical mobility are significant detractors for many to remain in their homes.

Pull factors are specific attributes of a community or facility that are advantageous to older adults and often ameliorate negative aspects of their home environment. The ability of a community or facility to provide care resources is extremely important to older adults who do not have access to adequate caregivers at home. The idea of leaving strenuous yard work and home maintenance behind is an appealing aspect of residential care (Krout et al., 2002). Retirement communities strive to address themes of active aging through their built environment and activities, emphasizing physical, social, and emotional well-being.

University Based Retirement Communities (UBRCs) provide an innovative retirement alternative. Familiarity with a community increasingly affects the decision of selecting a location for retirement (Cuba and Longino, 1991; Haas and Serow, 1993). Therefore, a higher percentage of retirees may become return migrants to former

residence locations. Such migration usually occurs in either a previous employment city or where they attended school, such as a college town. Research indicates that an increasing number of seniors are considering college towns for retirement relocation due to lifelong learning opportunities, cultural lifestyle, athletic activities, and nearness to young people (Hu et al., 2008). Elements of the successful aging model (Rowe and Kahn, 1997) are often more pronounced in a university setting. Universities and colleges are adding classes and programs to meet the interests of older adults. More than two-thirds of U.S. universities and colleges are also offering part tuition waivers or even free tuition to elders (Howells, 2001).

Population aging is a demographic phenomenon that occurs when the percentage of older adults within a society's total population rises; it describes a population where the proportion of persons 60 or 65 and older is increasing (Kurek, 2007). Population aging, or demographic aging, is now taking place throughout the United States and is a significant variable in providing equitable LTC provision. Population aging stems from a decrease in fertility rates and mortality rates. Regional variations in population aging are common and are often attributed to the migration patterns of younger residents. Geographic concentrations of older adults are influenced by two major themes: aging in place or community and migration. Most seniors will age in place and community, while a minority of more affluent seniors will migrate to retirement destinations that possess a host of desirable amenities (Longino, Perzynski, and Stoller, 2002).

The Baby Boomer generation is reaching retirement and their propensity to age in place will dramatically affect the geographic distribution of seniors throughout the

country (Andrews et al., 2007). Expected uneven yet constant growth in the senior population throughout the nation presents unique challenges for all communities (Frey, 2007). An understanding of the geographic distribution of older adults is critical to providing appropriate levels of continuum of care services (Andrews and Phillips, 2005; Joseph and Hallman, 1998).

Currently large pre-senior populations are predominately found in metropolitan and suburban areas in the West and South of the United States (Frey, 2007). The Sunbelt achieved recent population growth by attracting a large younger workforce. However, many residents who migrated to these locations when they were young have remained and are now approaching retirement. Pre-Seniors in these regions are generally financially stable, physically healthy, and possess a greater ability and desire to shape public policy to suit their specific needs. In contrast, already large senior populations found in many Snowbelt and older cities in the Northeast and Midwest of the U.S. will see less growth (Frey, 2007). A disproportionate number of older seniors in these areas are more likely to be disadvantaged financially and in poorer health (Frey, 2010).

Stephen Golant conducts demographic research of AIP primarily at the metropolitan scale. Golant (1992) analyzes the growing trend of AIP in U.S. suburbs, contrasting previous notions that aging populations were largely located in central cities and that suburban populations were principally comprised of younger residents and families. Golant (1992) emphasizes that accessibility and the spatial distribution of Continuum of Care resources are of increasing importance in metropolitan areas. Additional inquiries focus on the problems older people encounter in both urban and rural

environments and the implications for local planning and expanding public policy (Cloutier-Fisher and Joseph, 2000). AIP establishments and employees offer a valuable method of gauging successful aging, and it is important to investigate the spatial distribution of AIP Facilities and Home and Community-Based Services (HCBS) as they relate to the geographic distribution of the populations that are most in need.

Health and living environments is comprised of research that explores the spatial dimensions of older adults' health and the relationship between aging populations and their living environments. While these are distinct lines of inquiry, both are a fundamental building block of geographic gerontology (Andrews et al., 2009). Health geographers mainly use quantitative methods to spatially examine older people's mortality and morbidity (Huisman et al., 2003). Links between aging populations and the specific environments they negotiate are increasingly explored through qualitative methods. Researchers concerned with living environments of aging populations are investigating a broad range of residential settings and aspects of the community, where older adults may work, socialize, and seek care (Andrews and Phillips 2002; Golant and LaGreca, 1994). Although methodologically different, both lines of inquiry concerning health and living environments speak to the importance of the relationship between older adults and the environment in understanding population aging (Andrews, 2009; Wiles, 2003).

Services, planning and policy provides a research focus directly tied to the distribution and regulation of all resources dedicated to the support of older people. This avenue of geographic inquiry is well-suited for examining the provision of adequate

continuum of care services that promote Aging in Place and within Community. Current research on health-care provision and employment within the continuum of care is being cultivated among many academic disciplines including medical sociology, occupational science, nursing studies, and more specifically cultural and economic geography (Andrews and Evans, 2008; Parr, 2004). This field of study has evolved from a primary concern about the allocation of goods and services, notably institutional and community-based services, to encompass a full examination of public policy issues concerning health and social care for older adults (Skinner and Rosenberg, 2005).

Research on economic and supply factors of continuum of care employs a critical perspective, accentuating the importance of place on health policy and care provision. Andrews and Phillips (2002) establish empirical connections between geographical research and health services, influencing the process of service provision. Geographical Gerontology has tremendous potential to investigate these issues (Andrews et al., 2007) but has also received criticism for failing to adapt more innovative theory (Rosenberg, 2003; Harper and Laws, 1995).

Specific investigations center on political structures and their relationship with both formal and informal care (Wiles, 2003; Milligan and Wiles, 2010), specifically how these structures affect access and quality of care services. Economic, political, and institutional changes have relocated and altered care provision and have influenced the places older people receive both institutional and home-based services (Wiles and Rosenberg, 2003). Such policies are important because an increasing amount of care provision is now administered at a home rather than through a traditional institutional

setting. The social and economic impacts of this trend are specifically significant for Geographical Gerontology that focuses on employment, because home-based care is most often provided informally (Wiles, 2003; Milligan and Wiles, 2010).

Although there is debate concerning the most effective way to focus public policy surrounding LTC (Aminzadeh et al., 2004), many policy makers and researchers are advocating for the reallocation of LTC resources towards HCBS, designed to accommodate an aging population and curb the significant expense of residential care (Gibson and Rowland, 1984; Milligan and Wiles, 2010). HCBS are meant to provide a level of care that allows older adults to remain in an environment of their choosing. The financial advantage of HCBS is largely predicated on favorable geography and neighborhood characteristics; an inefficient distribution of services will significantly raise cost (Andrews and Phillips, 2002).

An unmistakable trend towards smaller and more specialized care provision is blossoming. Although formal institutional facilities continue to provide continuum of care services, the economic and social climate is requiring them to adapt by providing services outside their traditional boundaries (Andrews et al., 2006). Neatly designed administrative units and care markets are increasingly being blurred and replaced with smaller, more community-based care settings. New economic conditions and modes of continuum-of-care delivery are significantly altering the way older adults receive healthcare services. This profound structural change is clouding the line between public and private healthcare provision and invites new, innovate geographical theory to adequately account for its evolution.

2.3 Conceptual Evolution of AIP

The theoretical framework for geography of Aging in Community opportunity is expansive, stemming from multiple academic disciplines. Aging in Place is a concept that reflects most seniors' desire to determine their surroundings as they age and articulates the importance of the relationship between older adults and place. A strong physical and emotional bond exists between older adults and their homes and community (Andrews et al., 2007). Although remaining at home is a dominant theme in AIP, a more explanatory principle is the search for residential normalcy (Golant, 2011). Settings that promote residential normalcy strive to maximize both comfort and a sense of mastery. This approach to LTC provision gives legitimacy to a much wider range of care setting options and models that facilitate aging within the community (Golant, 2011).

Theories regarding Aging in Place initiatives are chiefly described as being either focused on a person or the environment. Person-focused lines of inquiry are concerned with targeting specific subgroups or segments of the older adult population (Greenfield, 2012). Environment-focused theories are concerned with the impacts of social systems and public policy initiatives. Specific disciplines explore AIP at different geographies or ecological classifications. The micro level is person focused and describes an individual's home—the immediate physical and personal surroundings—and highlights an individual's desire to remain in a familiar environment. The macro level is focused on the environment and chiefly comprised of services and resources found at the community or neighborhood level. Macro Systems are driven by politics, economics, and social

capital; these systems articulate a society's desire to provide aging adults the opportunity to self-determine their environment and remain engaged in the community (Lee, 2008).

Initially, AIP described older adults' desires to remain in their homes as they age but has expanded to encompass the greater community and a wide range of Service Enriched Housing environments, including retirement communities and assisted living facilities (Ball et al., 2004; Bernard, Zimmerman and Eckert, 2001). It is important to understand the evolution of AIP, a concept that has broadened over years of investigation, to provide a framework for theory development and to apply in policy and practice. Conceptual models of AIP continue to mature from an initial aim to express a desire to age in a familiar environment (Rosel, 2003). Rosel (2003) articulates the evolving nature of AIP, arguing that as society is influenced by technology, globalization, and mobility, the meaning or definition of AIP conforms to contemporary society. Lawton (1990) contends that the physical environment is the only constant in the development of the AIP concept.

Lee (2008) explores AIP and puts forward a comprehensive definition that centers on the philosophy that AIP and access to appropriate health care and community services are a fundamental human right. Contemporary AIP policy emphasizes society's responsibility to facilitate independence and provide options and tools for older adults to determine where they age. A self–determined environment is a more expansive concept than familiar environment, encompassing both institutional and non-institutional care alternatives, and provides greater choice in determining appropriate residential environments and specific levels of care. Self-determined environment is a central theme

of AIC, encompassing all goods, services, and people that affect where an individual may age.

AIC is a concept that exemplifies a broader definition of AIP and has recently garnered attention as an innovative aspect of the Continuum of Care Paradigm, providing an alternative to the general notion of institutional care at one end of the spectrum and aging at home on the other (Thomas and Blanchard, 2009). AIC has drawn attention from many disciplines that seek to employ a critical view of the relationship between aging, health, and place (Andrews et al., 2007). Researchers have expanded concepts of place and space to include a home, community, or region and argue that people may become attached to multiple locations (McHugh and Mings, 1996).

Cutchin (2003) puts forward a model of AIP founded on social institutions and personal experience. The qualitative empirical analysis investigates how concepts of home and community are expressed and experienced in adult day centers (ADC) and assisted-living residences. Martin et al., (2005) investigate the relationship between place and care provision in a variety of care settings; they determine that environment is interpreted individually based on a mixture of social, cultural, and policy factors. Identification with and affection for a place or community are an impetus for favorable memories and help to promote and maintain a sense of self-worth in the face of declining health. A more practical advantage to aging in a self-determined setting is the proximity to family, friends, and other established social support systems (Cutchin, 2003).

2.4 Continuum of Care

LTC occurs along a continuum (**Figure 2.2**) and is provided in a range of settings. The Continuum of Care Paradigm supports AIP and Aging within the Community. The continuum represents a range of services developed and organized to address the variety of needs individuals have as they age. This concept recognizes and considers the availability and extent of long-term care systems and services in the community and in institutional settings. Included in the continuum of care are residential alternatives, in-home care, community programs, and institutional service. A move from institutional care towards a more person-centered approach allows AIP to account for an individual's exact level of care and specific residential environment (Bigby, 2008; Dobbs, Hayes, Chapin, and Oslund, 2006; Perez, Fernandez, Rivera, and Abuin, 2001; Van Wezemael and Gilroy, 2007). Housing and home health products assisting in AIP continue to change and adapt to the needs of an aging population. Residential Care and FBS communities provide a broad range of housing options and levels of care within the community that could slow a need for more institutionalized care (Dobbs, Hayes, Chapin, and Oslund, 2006).

Institutional LTC, specifically Nursing Homes, receives criticism for hastening emotional and physical decline in residents. A primary criticism is that many facilities are isolating, restricting mobility and depriving residents of necessary social relationships and contact with outside society (Gibson and Rowland, 1984; Salamon and Rosenthal, 2004). Recently developed FBS communities have responded to these concerns by building environments that promote social interaction, and encourage the development of

healthy lifestyles (Bernard et al., 2007, Laws, 1993; Lucksinger, 1994). These communities emphasize participation in specific activities to maintain a healthy sense of self (Bernard, 2004; Bernard et al., 2007). FBS communities provide appropriate levels of care to diverse resident populations that require a wide range of services.

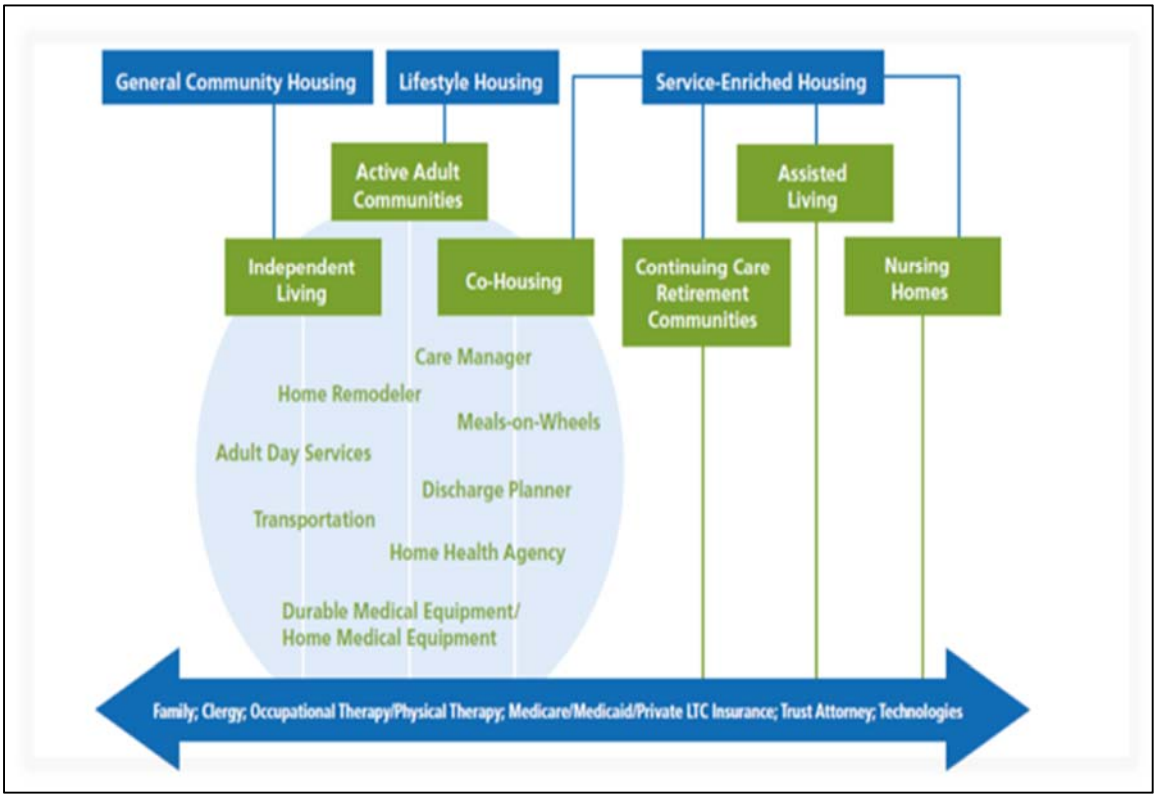

Figure 2.2. Continuum of Care. Source: MetLife Mature Market Institute. The MetLife Report on Aging in Place 2.0: Rethinking Solutions to the Home Care Challenge. Tenenbaum, (2010). www.metlife.com/mmi/research/aging-in-place.html#insights

There is an unmistakable deficiency in scholarly research that specifically focuses on the geography of the continuum of care from a supply side or employment perspective, providing the impetus for this dissertation. The following section of this literature review will describe the unique and complex forms of healthcare, housing and

social services within the continuum and examine theoretical studies accentuating geographic principles that influence continuum-of-care employment within the United States. The most recent research focuses on smaller service providers and more informal participants of caregiving such as volunteers or family members (Wiles, 2003; Milligan and Wiles, 2010). This theoretical stream of inquiry is particularly fruitful, as continuum of care services continue to gravitate towards more informal settings and the private home. Theories and concepts addressing Aging in Community provide a better understanding of the complex web of healthcare provision comprising the continuum of care (Cutchin, 2003).

2.4.1 Service Enriched Housing/Facility-Based Services

It is important to illustrate the taxonomy of Continuum of Care providers to reveal its academic maturation. Services dedicated to the Continuum of Care take place in Service-Enriched Housing or Facility-Based environments and within Home and Community-Based settings. The most common forms of Service-Enriched Housing include Continuing Care Retirement Communities (CCRCs), Assisted Living (AL), and Skilled Nursing Facilities (SNFs), (Tenenbaum, 2010).

Continuing Care Retirement Communities provide the most independent and amenity-rich Service-Enriched Housing or Facility-Based option. These facilities are usually campus-type retirement communities that offer a range of housing, support services, and healthcare that is centrally planned and administered. Their intent is to supply a continuum of care throughout the lifetime of elderly residents. This continuum allows residents to come into the community when they are still healthy and move on to

more intensive care as it becomes necessary (Sanders, 1997). CCRCs foster full autonomy, while actively promoting and addressing Rowe and Kahn's (1997) three key aspects of successful aging. The Litwak and Longino (1987) model is compressed within the CCRC framework. A decision to move to a CCRC encompasses all three types of moves presented in the model and serves as a response to pull factors as well as an anticipation of push factors.

A major drawback that influences the geography of CCRCs is their expense; a lack of affordability is an impediment to many older adults who may wish to move to a CCRC. CCRCs and other retirement communities geared towards a more independent lifestyle are principally funded through private sources and do not accept Medicare or Medicaid. Residents of these LTC communities tend to be white and more affluent (Streib, 2002). There are usually high costs associated with lifetime contracts and entry fees. The amount of these fees can vary tremendously; entry fees can exceed $600,000, and additional monthly payments are required (Netting and Wilson, 2006). Fees are determined by the size of the living unit and the geographical region where it is located (Groger and Kinney, 2007). The American Association of Homes and Services for the Aging, now known as Leading Age, provides data indicating that CCRCs in the Great Lakes and Central United States regions appear to have slightly lower prices than those in the South, West, and Northeast. CCRCs differ in architectural styles and sizes, ranging from luxury high-rises to those resembling ranches or cottages. These styles are meant to mimic the architectural styles of specific geographies. Services provided by CCRCs also vary by location, reflecting the social ideals of specific geographies (Krout et al., 2002).

Although Assisted Living facilities are often mentioned along with Nursing Homes, significant differences exist between them and the services they provide. AL facilities provide housing for independent living but focus on delivering assistance with activities of daily living (ADLs) and Instrumental Activities of Daily Living (IADLs). ADL tasks mainly include administering medications, transportation, bathing, assistance with dressing, and eating. IADL assistance focusses more on independent living, such as managing finances, preparing meals, shopping, and housework. It is also common for AL facilities to accommodate residents with Alzheimer's or dementia (Golant, 2011).

Assisted Living facilities costs are predominately paid without government assistance or Long-Term Care insurance, with 79 percent of services paid for through personal finances (Andrews and Crooks, 2010). Assisted Living models vary significantly throughout the United States. Differences in organization, philosophy of care, and facility design are often quite substantial, where the appearance of the facility is often meant to mimic the culture and values of the larger community (Cutchin, Marshall, and Aldrich, 2010). Access to affordable AL facilities will undoubtedly garner future attention and research, because they present a more cost-efficient alternative to nursing homes. Monthly rates for Assisted Living range from $3,000 to $8,000, depending on the required level of care (Frank, 2012).

Skilled Nursing Facilities or Nursing Homes provide services to individuals who require 24-hour care. Institutional types of care such as Nursing Homes typically accept Medicaid and Medicare (Frank, 2012) and are generally populated by the oldest-old, those with elevated physical and cognitive impairment, and those less affluent (Cuijpers,

Lammeren, and Duzijn, 1999; Gosney, Tallis, and Edmond, 1990; Quinn et al., 1999). Nursing Homes typically offer services geared towards residents who can no longer live independently and require a heightened level of care that involves fully trained nurses. Nursing Homes are rented monthly, and residents often remain in these types of facilities for the remainder of their lives. Nursing Homes are the most common institutionalized form of Long-Term Care Facilities (Golant, 2011).

The philosophy of long-term care is evolving, and new innovative care models reflect a movement towards a less institutional approach. A national movement known as "Culture Change" is gaining popularity by shifting from the traditional medical model to a more holistic approach, designed to promote personal engagement and more fully consider the values and choices of residents in a respectful manner. The movement began in the 1990s and gained momentum through the Pioneer Network and Eden Alternative philosophies of care, both of which promote resident autonomy and matching care to individual needs. Dr. William Thomas began the Eden Alternative concept, which has culminated in The Green House Project (Ragsdale and McDougall, 2008). The Green House Model is a skilled nursing option designed to accommodate ten to twelve residents in a private homelike setting. This paradigm shift presents a framework for person-directed care, accentuating a homelike atmosphere, close relationships, collaboration, and a sense of community, while not infringing on residents' independence or autonomy (White, 2014). The Culture Change movement has greatly improved the attractiveness of FBS options, specifically AL and SNFs that require elevated levels of care, as LTC and aging-within-community options.

2.4.2 Home and Community-Based Services

Home and Community Based-Services are comprised of public and private entities designed to meet Continuum of Care needs of residents in their home instead of an institutionalized setting. The objective of these services is to keep individuals in their home environment if they want to remain by offering an appropriate level of care. A suitable range of care should address physical, mental, social, economic, and safety needs of aging adults (Akhter and Levinson, 2003; Lau et al., (2007). This philosophy of service delivery remains the same for all care recipients; however, the type of care is unique for each resident depending on environment and level of care need.

HCBS administer medical services as well as non-medical social services (AHCA, 2004). Common medical responsibilities include care management by coordinating home health care and physician services, dementia programs, mental health services, adult day health programs, and medication management and/or assistance. Typical non-medical services are nutrition programs such as congregate meals, meals on wheels programs, legal services, volunteer senior companion programs, and other in-home services (Lehning and Austin, 2010). HCBS are particularly important because roughly seven percent of older adults require assistance with ADLs and another 17 percent need help with IADLs, but almost half of these older adults with functional limitations do not receive sufficient assistance (Feldman, et al., 2003).

Community-based transportation is a vital component of Home and Community-Based Care, allowing residents who do not drive or have trouble navigating standard public transportation the opportunity to receive services outside the home and achieve

social engagement. Senior Centers and Adult Day Healthcare Facilities house numerous programs focused on improving physical and cognitive well-being. These services allow older adults to continue to cultivate new interests and participate in new activities, providing a more fulfilling life (Lehning, Chun, and Scharlach, 2007).

Geography and space are instrumental in successfully implementing HCBS that foster AIP efficiently. There are numerous challenges with AIP centered on the built environment and the availability of support services. Barriers that prevent individuals from remaining in their homes as they age include a difficult home environment, poor community design, lack of transportation, and an inappropriate level of community medical and social support services. Certain demographic characteristics make providing HCBS more feasible. Densely populated areas provide economies-of-scale advantages that allow health and social support services to be administered in a more efficient manner (Golant, 2008). This approach is more effective when service providers do not incur burdensome transportation costs and excessive travel times (Evashwick and Holt, 2000).

There is tremendous variation in the capacity of individual communities to administer home-based assistance to their residents (Golant, 2005). Local government and the presence of charitable and non-profit organizations are critical participants in providing effective home-based care, particularly for the more vulnerable senior population (Alley et al., 2007). Urban areas are usually better equipped to deliver the myriad of required community services and housing options, where more rural or remote locations have difficulty providing most home-based services (Golant, 2003). Programs

dedicated to AIP are engaged in coordinating multiple HCBS to provide a personalized care strategy to meet individual needs. Home and Community-Based programs often serve to delay or slow the need for institutional care options by attending to residents' needs before they progress to a critical level (Hutchison, Hawes, and Williams, 2005). AIP programs, such as The Program of All-Inclusive Care for the Elderly (PACE), are crucial for development in AIP because they make coordination of the various AIP service parts attainable. PACE is a comprehensive federally supported public program coordinating health care, nutrition, social, and transportation services to older adults living within a community (Lau et al., 2007; Lee, 2008).

Naturally Occurring Retirement Communities (NORCS) are geographically defined areas with high concentrations of older adults (Hunt and Gunter-Hunt, 1986). A NORC is a community that naturally developed and contains a high percentage of older adults, because residents either remained in these communities as they aged or moved into them when they retired. NORCs exist in various forms and locations, including neighborhoods of apartments, condominiums, and single-family houses. The defining feature of NORCs is they were not built as intentional retirement communities but rather represent a place that evolved over time due to a combination of factors, including adults aging in place, the out-migration of younger households, and the in-migration of older households (Carpenter et al., 2007; Ivery et al., 2010). The economies of scale of NORCs are conducive to the utilization of HCBS.

Two innovative approaches designed to bring HCBS to NORCs are Elder Villages and NORC Supportive Service Programs (NORC SSPs). The first NORCs

appeared in New York City in the late 1980s, were expanded by The United Jewish Federation as a national initiative in 2001, and are now found throughout the United States (Golant, 2011). Residents of the Beacon Hill neighborhood in Boston formed the Beacon Hill Village in 2002 and the movement has now prospered into "The Village to Village Network" (Greenfield, Scharlach, and Lehning, 2012). Although both programs promote community-based supportive services and health care to help their residents age in place, they differ in the way they provide services. Supportive services programs in NORCs are administered via public-private partnerships including governmental and foundation support. The fundamental characteristic of villages is that they emerge from grass roots type activity. They are structured as a nonprofit that aims to hire key staff from within the community to help coordinate services and activities that help members continue to stay in their homes (McWhinney-Morse, 2009). Resident participation in both models is optional, and membership fees fund the programs (Golant, 2011).

A proliferation in innovative home health-care products gives older adults the option of receiving care at home. Advances in technology have greatly enhanced the lives of older adults and caregivers assisting in AIP. Architects and housing professionals are incorporating Universal Design strategies and other design elements that provide a built environment that can be successfully navigated and utilized by individuals of any age or health status (Miller, Olson, and Garner, 2007). Specific strategies employed in Universal Design include handrails, ramps, location of appliances, and improved lighting techniques, which promote independence and self-determination for older residents. The National Association of Home Builders (NAHB) and the

American Association of Retired Persons (AARP) have partnered together to create the Certified Aging in Place Specialist (CAPS) credential program. CAPS are trained professionals that build and modify environments that promote AIP and self-determination (AARP; http://www.aarp.org/home-garden/home-improvement/info-03-2004/caps.html).

Efforts to transform nursing homes' culture of care delivery to more home-like environments include changing both specific components of care and comprehensive change across entire organizations. Models of culture change include the Wellspring Model's learning collaborative approach, the Eden Alternative Model's human habitat and architectural changes, and Green House Model's elder-centered care in small homes (Zimmerman, Shier, and Saliba, 2014).

2.5 LTC Workforce

With the challenges of population aging and increasing demands on the utilization of LTC among the elderly population in The United States, studies concerning the geography of the LTC workforce and its role in promoting Aging in Community are urgently needed to contribute knowledge for both researchers and policy makers. The U.S. Census Bureau projects the population of Americans 65 and older to increase from over 40 million, 13 percent of the total population in 2010; to 72 million, 19 percent of the population, by 2030; and 89 million, 20 percent of the population, by 2050. It is projected that the demand for LTC will increase from the current 12 million to over 27 million by 2050 (SCAN, 2012). Direct care workers, whether working in residential settings or in a person's home, are often most familiar with the individual and his or her

service needs and are best able to provide services and supports in a person-centered way. Individuals with high levels of disability and complex health conditions increasingly receive long-term services and supports (LTSS) in home and community-based settings, increasing the skill demands both for family caregivers and paid workers.

The demand for LTSS far exceeds the supply of qualified, paid workers; the result is a severe workforce shortage of professionals and paraprofessionals to manage, supervise, and provide LTSS in the United States. Two fundamental problems with the quality of nursing home care are inadequate staffing and a poor ratio of licensed nursing staff to certified nurse assistants (Ng, Stone, and Harrington, 2015). The workforce shortage is a result of high turnover, large numbers of vacancies, and difficulty attracting and retaining well-trained staff, a situation which affects the quality and accessibility of well-trained employees (Bryant and Stone, 2008).

Long Term Care is provided by informal caregivers or formally within the Continuum of Care production system comprised of HCBS and FBS. Most formal care is provided by direct care workers, and is complemented by some professional medical and administrative occupations (Stone and Harahan, 2010). Direct Care Workers experience poor working conditions, low pay, and high levels of staff turnover (Stone et al., 2013). Milligan and Wiles (2010) explain that staff turnover, predominantly attributed to unfavorable working environments, negatively impacts the physical and mental health of care recipients. In 2009, it was estimated that over 43 million Americans provided informal care to an adult over 50, delivering on average 20.4 hours of care per week (SCAN, 2013).

The availability of informal caregivers is often the significant factor in whether a person's care needs can be met outside of a long-term care facility. As an example, half of all older adults with long-term care needs and an inadequate network of family and friends are in nursing homes, compared with only seven percent of those with needs who have family or other informal caregivers (Stone, 2013). The Caregiver Support Ratio, or the ratio of potential caregivers in the population to potential care recipients (based on age), was more than seven caregivers for each older adult over 80 in 2010 (Redfoot, Feinberg, and Houser, 2013). The AARP defines the "caregiver support ratio" as the number of potential caregivers ages 45-64 for each person age 80 and older and uses this support ratio to document the projected declining availability of family caregivers to provide LTSS assistance over the next few decades.

Silverstein and Wang (2015) review literature that investigated the question of whether informal family care serves as a substitute for formal care, looking specifically at whether certain cultures and ethnic populations that prioritize family care will experience a lack of formal LTC initiatives and care opportunities. The most empirically rigorous studies found that informal care reduces home health care use and delays institutionalization (Charles and Sevak, 2005; Van Houtven and Norton, 2004), supporting a substitution argument. Cultural justification for caregiving, a concept that has received theoretical and empirical attention (Dilworth-Anderson et al., 2005) in social gerontology, attributes caregiving behavior chiefly to cultural values and precepts. A greater proportion of Mexican-Americans than non-Latino whites state a preference for informal over formal caregivers (Min and Barrio, 2009). Similarly, Asian immigrants

tend to endorse collectivist cultural values and are less likely to seek out formal services than native-born residents (Lee and Eaton, 2009). Silverstein and Wang (2015) emphasize the importance of maintaining an adequate supply of publicly subsidized formal care. Additionally, Silverstein and Wang (2015) contend that LTC insurance is often unaffordable, further enhancing the role of informal caregivers, particularly in cultures with strong familial tradition.

2.6 Summary and Discussion

Empirical research methods, stemming from a variety of academic backgrounds, are investigating a number of LTC research topics. Empirical methods are well suited to analyze the spatial distribution of health-care resources and identify the relationship between service need and provision, critically addressing issues of access, equity, and efficiency (Gatrell and Loytonen, 1998; Joseph and Cloutier, 1990). Equity is used to gauge how well resources are meeting the needs of a population, and is deemed to be unequal when specific groups of people with a need are unable to receive the same level of care that other groups experience (Rice and Smith, 2001). Efficiency, however, is meant to provide the maximum level of service to the maximum number of people at the lowest cost (Rice and Smith, 2001). Spatial relationships and mismatches between the older population and LTC resources strongly influence equitable and efficient access and utilization of LTC. Empirical evidence suggests that access is influenced by social, cultural, economic, as well as geographic variables (Falcone and Broyles, 1994; Netten and Darton, 2003).

Supply and demand factors of the continuum of care industry are evident within the discipline of Economic Geography (Andrews and Evans, 2008). Much of this line of inquiry is concerned with demand and consumption, leaving a significant void in the literature focused on supply side and employment in services for older adults. Geographers use critical perspectives to study the economic forces that influence the experience of aging in both rural and urban living environments (Moore and Rosenberg, 2001). Wiles (2003, 2005) uses a critical lens to study informal LTC provision in the community, focusing on the home as a setting for provision and consumption of informal LTC. Geographers are also investigating how place affects the decision-making process of choosing LTC products and services.

Empirical methods coupled with a critical perspective are well suited for identifying and ameliorating social and environmental justice issues. This approach has been used to highlight LTC deserts or locations without suitable LTC options, where access to AIP and Continuum of Care is limited. Rural states and counties are particularly vulnerable to care gaps; these areas often possess a more pronounced aging population, coupled with a shortage of formal long-term care options and community organizations that facilitate AIP. There are several critical gaps and challenges in LTSS service delivery. While the current LTSS landscape for dementia varies from state to state, largely because of differences in state Medicaid programs which finance the majority of LTSS that are not paid for out of pocket, some general themes emerge on a national level (O'Shaughnessy, 2014).

The concept of AIP is expanding to include the community and FBS establishments. The practice of AIP, within an intentional community is becoming more common (Thomas and Blanchard, 2009). Some CCRCs are eliminating the Assisted Living component of their projects; residents live in Independent Living, with in-home services provided as needed, until their advanced needs require them to move to the Skilled Nursing environment. AIP is also blurring the boundaries along the continuum of care; LTC providers are now lengthening independence by offering in-home services.

Aging in Community has been described as A Third Way (Thomas and Blanchard, 2009) of Aging in Place. The traditional continuum positions institutional long-term care at one end of a spectrum and an idealized vision of aging in place in one's home at the other. An increasing number of Americans are searching for and finding Aging in Community alternatives that facilitate older adults to live as independently as possible as members of the community of their choice. For some, this means growing older in a familiar home; for others, it means transitioning to a more suitable and supportive setting but one still in their community. Expanding the concepts of place and space to include a home, community, or region accounts for people that have become attached to multiple locations (McHugh and Mings,1996). The study of Aging in Place is multi-disciplinary, and only a small amount of research has been conducted by Geographers, especially from the supply side perspective. Research methods will be discussed in detail in the following Chapter III.

CHAPTER III

RESEARCH DESIGN

The purpose of this dissertation is to examine Aging in Place and Community opportunity throughout the United States by investigating the geography of employment in Facility-Based Services and Home and Community-Based Services. The expansion of AIP to account for complex forms of healthcare, housing, and social services administered within a community is essential to the conceptual and methodological framework of this dissertation. Aging-in-community models promote empowerment and customized care in self-determined environments and are predicated on consumer choice. This dissertation will illustrate AIP opportunity and consumer choice by measuring county employment in Facility-Based Services (FBS) and Home and Community-Based Services (HCBS) per 1,000 residents.

This study will identify and empirically analyze key predictor variables that gauge social capital, cultural values, and other community characteristics that influence employment within establishments primarily engaged in providing services devoted to the Continuum of Care production system. A descriptive analysis and GIS mapping will explore the spatial distribution of the aging population and the supply of AIP and LTC employment in the U.S. Stepwise regression models will identify specific population measures, socio-economic factors, and environmental characteristics that affect the geographic supply of the LTC production system. A critical analysis of quantitative data

will explore the relationship between LTC employment and residential populations at the county level, with a primary focus on metropolitan counties.

The statistical analysis is conducted at the county level, the most commonly cited geographic market of Long-Term Care (Bowblis, 2012). A component of this research agenda includes a national examination of the LTC production system. Descriptive analysis and GIS mapping will illustrate the distribution of the LTC production system by county throughout the United States. Counties within Metropolitan Statistical Areas (MSAs) are the focus of this investigation and regression analysis. The 436 counties comprising large MSAs, which have populations over one million residents, are parsed out and examined separately from the remaining 731 counties that comprise medium and small MSAs. The geographic framework and study area is derived from the 2013 National Center for Health Statistics' (NCHS) Urban–Rural Classification Scheme for Counties.

The NCHS urban-rural scheme provides a geographic system for examining the relationship between urban intensity and the health of residents in both urban and rural settings (Ingram and Franco, 2014). The NCHS is county based because counties are a stable political unit and are generally responsible for executing federal and state health programs and initiatives. Furthermore, reliable county-level data articulating population measures, socio-economic factors, and environmental characteristics is readily available. This scheme sorts all U.S. counties as metropolitan or nonmetropolitan. Nonmetropolitan counties are identified as micropolitan and noncore.

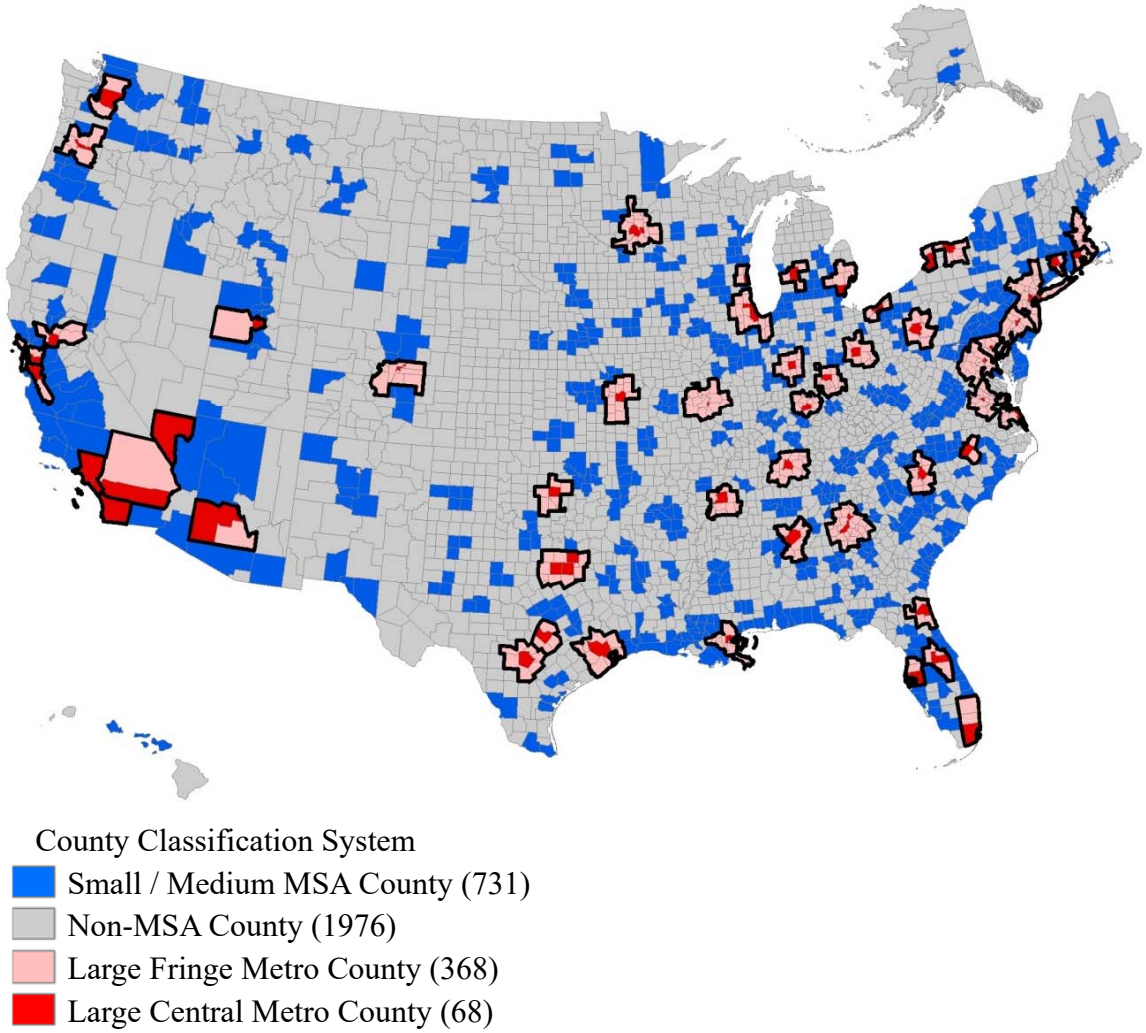

Figure 3.1. Distribution of Counties by MSA Classification, Derived from the 2013 NCHS Urban-Rural Classification System for Counties.

MSA counties are subdivided by the total population of the MSA: large metros (one million or more), medium metros (250,000 to 999,999), small metros (less than 250,000). Large metro counties are further split and classified as central or fringe (Ingram and Franco, 2014). Large central metro counties are defined as counties in MSAs of one million or more population that contain the entire population of the largest principal city of the MSA or have their entire population contained in the largest principal

city of the MSA or contain at least 250,000 inhabitants of any principal city of the MSA. There are 68 counties that qualify as large central metro counties. **Figure 3.1** illustrates large MSA counties, large central metro counties, and medium and small MSA counties.

An investigation centered on MSA counties is justified since approximately 85 percent of the U.S. population resides within a MSA, and 54 percent live within large MSAs that possess over one million residents (OMB, 2013). Percentages of AIP employment found in MSA counties **(Table 3.1)** are similar to and generally mirror the total population. A MSA is comprised of a core urban area of 50,000 or more population, together with adjacent counties having a high degree of economic and social integration with that core (OMB, 2013). Large MSAs over one million residents often possess a competitive advantage, presenting heightened levels of opportunity and innovation. Parsing out counties within large MSAs from the remaining MSA counties provides a platform to identify and compare predictive variables that determine the geography of the LTC and AIP production system in distinct geographies.

Table 3.1. Long-Term Care Employment by County MSA Classification (% of Total U.S. LTC Workforce).

COUNTY CLASSIFICATION	AIP EMPLOYEES	FBS EMPLOYEES	HCBS EMPLOYEES
US TOTAL: 3143	4,809,574	2,562,723	2,246,851
	(100%)	**(100%)**	**(100%)**
MSA: 1167	4,063,097	2,096,180	1,966,917
	(85%)	**(82%)**	**(88%)**
MSA - LARGE: 436	2,576,459	1,279,930	1,296,529
	(54%)	**(50%)**	**(58%)**

Table 3.1. Cont.

COUNTY CLASSIFICATION	AIP EMPLOYEES	FBS EMPLOYEES	HCBS EMPLOYEES
MSA - MED AND SMALL: 731	1,486,638	816,250	670,388
	(31%)	**(32%)**	**(30%)**
MICRO: 641	444,558	266,856	177,702
	(9%)	**(10%)**	**(8%)**
OUTSIDE - NO CLASSIFICATION: 1335	301,919	199,687	102,232
	(6%)	**(8%)**	**(4%)**

3.1 NAICS Based Long Term Care Production System

The key research questions in this dissertation will largely consist of empirical testing that will use the North American Industry Classification System (NAICS) to define the Long-Term Care production system by county in the United States. "NAICS is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy" (USCB, 2012). The NAICS framework evolved from Standard Industrial Classification (SIC) codes, developed to facilitate the collection, presentation and analysis of economic data by industry.

NAICS is hierarchical in structure. It is comprised of two-digit codes, used to identify major sectors of the economy, and is disaggregated to six-digit industry specific codes. An example of this structure applicable to this dissertation is NAICS 623 (Nursing and Residential Care Facilities), which can be disaggregated to 62311 (Nursing Care Facilities) and 62331 (Continuing Care Retirement Communities and Assisted

Living Facilities for the Elderly) at the five-digit level. This industry group is disaggregated further to 623311 (Continuing Care Retirement Communities) and 623312 (Assisted Living Facilities for the Elderly) at the six-digit level, which serves to describe a U.S. national industry.

This analysis will apply five-and six-digit industry specific NAICS codes that are contained in the Health Care and Social Assistance (62) sector of the economy to quantify the dependent variables and capture the wide-ranging services provided within the Continuum of Care production system. The American Health Care Association (AHCA) utilizes the NAICS framework and classifies LTC establishments as either Facility-Based or Home-Based and further distinguishes between establishments that provide primarily medical care and those primarily providing non-medical care **(Table 3.2).**

Employment in the following Facility-Based and Home and Community-Based LTC industries, as defined by the NAICS, will be used to develop the dependent variables used in the regression analysis:

- **623110 Nursing Care Facilities (Skilled Nursing Facilities):** This industry consists of establishments primarily engaged in providing inpatient nursing and rehabilitative services. The care is generally provided for an extended period of time to individuals requiring nursing care. These establishments have a permanent core staff of registered or licensed practical nurses who, along with other staff, provide nursing and continuous personal care services.

- **62331 Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly:** This industry comprises establishments primarily engaged in providing residential and personal care services for (1) the elderly and other persons who are unable to fully care for themselves and/or (2) the elderly and other persons who do not desire to live independently. The care typically includes room, board, supervision, and assistance in daily living such as housekeeping services. In some instances, these establishments provide skilled nursing care for residents in separate on-site facilities.
- **621610 Home Health Care Services:** This industry comprises establishments primarily engaged in providing skilled nursing services in the home along with a range of the following: personal care services, homemaker and companion services, physical therapy, medical social services, medications, medical equipment and supplies, counseling, 24-hour home care, occupational and vocational therapy, dietary and nutritional services, speech therapy, audiology, and high-tech care such as intravenous therapy.
- **624120 Services for the Elderly and Persons with Disabilities:** This industry comprises establishments primarily engaged in providing nonresidential social assistance services to improve the quality of life for the elderly, persons diagnosed with intellectual and developmental disabilities, or persons with physical disabilities. These establishments provide for the welfare of these individuals in such areas as day care, nonmedical home care or homemaker services, social activities, group support, and companionship.

The dependent variables are designed to measure employment for establishments that promote AIP. Specifically, employment devoted to Facility-Based Services per 1,000 residents and employment dedicated to Home and Community-Based Services per 1,000 residents will illustrate disproportionately high or low numbers of specific AIP services. The following NAICS-Based dependent variables will provide a better understanding of the spatial distribution of AIP opportunity and identify pronounced care-gaps in LTC throughout the United States:

- **Total employment in Facility-Based Services per 1,000 residents:** *The sum of total employment in Nursing Care Facilities (NAICS 623110) and Assisted-Living Facilities - Community Care Facilities (NAICS 62331) per 1,000 residents.*
- **Total employment in Home and Community-Based Services per 1,000 residents:** *The sum of total employment Home Health Care Services (NAICS 621610) and Services for Elderly & Disabilities (NAICS 624120) per 1,000 residents.*

Table 3.2. Long-Term Care Classification.

	FACILITY-BASED SERVICES	**HOME-BASED SERVICES**
Primarily Medical	**Nursing Care Facilities** (NAICS 623110) *Services provided:* Inpatient nursing and rehabilitative services *Typical providers:* Skilled Nursing Facilities Nursing Homes Retirement Homes with Nursing Care Group Homes for the Disabled with Nursing Care	**Home Health Care Services** (NAICS 621610) *Services provided:* Skilled nursing services in the home along with personal care services, physical therapy, medications, medical equipment & supplies, etc. *Typical providers:* Home Health Agencies Visiting Nurse Associations

Table 3.2. Cont.

	FACILITY-BASED SERVICES	HOME-BASED SERVICES
Primarily Non-Medical	**Residential Care Facilities** *Assisted-Living Facilities - Community Care Facilities* (NAICS 62331) *Services provided:* Residential and personal care services for the elderly and other persons who are unable to fully care for themselves or live independently *Typical providers:* Assisted-Living facilities with or without on-site nursing facilities (623312) Homes for the elderly without nursing care Continuing Care Retirement Communities (623311)	**Services for Elderly & Persons with Disabilities** (NAICS 624120) *Services provided:* Non-medical home-based care of elderly *Typical providers:* Adult Day Care Center Senior Citizens Activity Center

Source: American Health Care Association. Data are presented by industry, using the North American Industry Classification System (NAICS).

3.2 Research Hypothesis and Independent Variables

Regression analysis of the LTC production system at the MSA county scale will address the hypothesis and research questions. A stepwise regression model for each NAICS-based dependent variable (total employment in Facility-Based Services per 1,000 residents and total employment in Home and Community-Based Services per 1,000 residents) will examine if specific quality of life indicators affects the geography of Aging in Place opportunity in MSA counties. The regression analysis will be conducted for the 436 counties and county equivalents in large metro areas as well as the 731 counties and county equivalents found in small and medium metro areas. The independent variables describe physical and social characteristics that define community at the county level. Independent variables are broken down into three categories:

population measures, socio-economic factors, and environmental characteristics

(Table 3.3).

Table 3.3. List of Independent Variables.

Independent Variables	Source
Population Measures	
Percentage Population Change From 2000 to 2013	U.S. Census (2000) (2013 ACS)
Percent of Population 85 and Older	U.S. Census (2013 ACS)
Percent of Baby Boomers (Population 50-69 Years Old)	U.S. Census (2013 ACS)
Percent of Population 65 and Older with a Disability	U.S. Census (2013 ACS)
Percent of Population 65 and Older with a Cognitive Disability	U.S. Census (2013 ACS)
Average Household Size of Occupied Housing Units	U.S. Census (2013 ACS)
Percent of Households with Person 65 and Older Living Alone	U.S. Census (2013 ACS)
Informal Caregiver Support Ratio (ICSR)	U.S. Census (2013 ACS)
Socio-Economic Factors	
Median Home Value	U.S. Census (2013 ACS)
Median Household Income	U.S. Census (2013 ACS)
Percent Asian Descendent	U.S. Census (2013 ACS)
Percent Hispanic Descendent	U.S. Census (2013 ACS)
Percent Foreign Born	U.S. Census (2013 ACS)
Percent Bachelor's Degree	U.S. Census (2013 ACS)
Percent of Owner Occupied Householder 65 and Older Moved in before 1980	U.S. Census (2013 ACS)
Percent of Workforce in the Creative Class	U.S. Census (2011 ACS) (USDA ERS)
Environmental Characteristics	
Population Density (Population per Square Mile)	U.S. Census (2010) (2013 ACS)
Percent Using Public Transportation or Walk as Means of Transportation to Work	U.S. Census (2013 ACS)
Physicians per 1,000 Residents	American Medical Association (2013)
Employees in Higher Education per 1,000 Residents	(2013 County Business Patterns)
Petris Social Capital Index (PSCI)	(2013 County Business Patterns)

The following hypotheses provide a framework to address the major geographic themes and primary research questions within this dissertation.

- It is hypothesized that employment in establishments involved in Aging in Place and the Continuum of Care are fundamentally shaped by a number of key population measures, socio-economic factors, and environmental characteristics that act to gauge culture and prosperity. Specifically, it is hypothesized that employment within AIP establishments per 1,000 residents will be higher and disproportionally located and clustered in the geographic areas that accentuate and promote these community traits.
- It is hypothesized that the geography of Aging in Place and Continuum of Care employment will vary between Facility-Based and Home and Community-Based Services. Specifically, the spatial distribution of high rates of Facility-Based Care employment per 1,000 residents will vary from the spatial distribution of high rates of Home and Community-Based Services employment per 1,000 residents. HCBS are hypothesized to require certain geographic factors and population densities that are found in more urban environments to be efficient.
- It is also hypothesized that a negative relationship will exist between Informal Caregiver Support Ratios and employment in Facility-Based Services. Specifically, geographies with low Informal Caregiver Support Ratios will rely more heavily on formal care alternatives, particularly Facility-Based Services and Service Enriched Housing options.

3.2.1 Population Measures

Population measures of U.S. Counties are important to analyze the geographic distribution of older Americans. Identifying geographies with sizable populations of older adults in absolute terms as well as communities comprised of high percentages of older adults is a primary indicator of AIP and LTC service demand. Population measures may indicate levels of formal LTC employment and the presence of possible informal caregivers, represented by the Caregiver Support Ratio. Specific Population Measures for this study address the following factors:

- **Percentage Population Change from 2000 to 2013:** County population for 2000 and 2013 will be used to establish a population growth rate for each county and measure if a community is growing, stagnating, or declining. It is expected that counties with higher population growth rates will also have higher percentages of Continuum of Care resources.
- **Percent of Population 85 and Older:** A large concentration of older adults in a county is likely indicative of a retirement haven, an aged population, or both. Older demographic groups require more care, particularly populations 85 and above. A negative relationship with dependent variables will identify locations that are underserved and articulate care gaps in LTC provision
- **Percent of Baby Boomers (Population 50-69 Years Old, 2013):** The percentage of Baby Boomers within a county is important to measure future AIP industry needs. The Baby Boomer cohort is expressing a desire for

innovative methods of AIP and LTC, and it is important to discover how their presence is affecting the supply of specific LTC establishments.

- **Percent of Population 65 and Older with a Disability:** The disabled population requires specific levels of care. It is important to measure the relationship between populations with at least one disability and AIP opportunity. This variable will address individuals 65 and over that possess at least one of the following disabilities: difficulty with hearing, difficulty with vison, cognitive difficulty, ambulatory difficulty, self-care difficulty, or an independent living difficulty.
- **Percent of Population 65 and Older with Cognitive Disability:** Specific analysis will focus on the percentage of a county's population with cognitive impairment. The increasing prevalence of dementia and cognitive impairment, particularly Alzheimer's Disease, is worthy of further spatial investigation because cognitive disabilities are common among LTC consumers.
- **Average Household Size:** The average household size will address a potential supply of informal caregivers. Larger household sizes are often indicative of specific cultural values that influence specific LTC and AIP service provision.
- **Percent of Households with Person 65 and Older Living Alone:** The percentage of older persons living alone is a good indicator of potential need of formal assistance and a lack of informal family caregiver support.

- **Informal Caregiver Support Ratio (ICSR):** Most Long-Term Care is provided informally by family and community residents, an influential factor in determining LTC provision. Current and projected levels of this ratio are critical in identifying geographies that will likely require formal LTC products and services. The Caregiver Support ratio is calculated as the number of potential caregivers ages 45-64 for each person age 80 and older.

3.2.2 Socio-Economic Factors

An investigation of county socio-economic factors will explore the influence of variables designed to gauge prosperity and cultural values on the supply of specific types of LTC and AIP opportunity. Although older adults and Baby Boomers are often identified as a single group, they are culturally and economically diverse with varying LTC customs and preferences. Pertinent socioeconomic factors of U.S. Counties include

- **Median Home Value:** Home values reflect a region's cost of living and are generally regarded as the most valuable asset a person or family will own. A general indicator of socio-economic status, home values may provide the most accurate measure of wealth for older residents who may be retired. Home values are thought to have a positive influence on home-based service consumption.
- **Median Household Income:** Income is generally used as a measure of the economic well-being of individuals and communities. Median Household Income is a widely-used measure of economic prosperity and will determine if

LTC and AIP opportunity changes with income. Counties with higher average wages are assumed to have a stronger, more diverse economy.

- **Race and Ethnicity:** The purpose of this classification is to determine if significant minority populations affect LTC and AIP provision. Research suggests that cultural influences affect LTC preferences; Asian and Hispanic populations are thought to rely on more informal methods of LTC provision. The percentage of the population that identifies as Hispanic and Asian will be measured.
- **Percent Foreign Born:** An indicator of naturalized citizenship, this variable will be used to identify if a relationship exists between LTC provision and a segment of the population that may possess different cultural views concerning family and aging, and may not be aware of, or feel comfortable using formal LTC and AIP services.
- **Educational Attainment:** The percentage of the population with a college education is an excellent measure of the overall quality of a county's labor market and an important factor in determining human capital. The educational attainment variable will address the percentage of each county's population 25 and older that received a bachelor's degree or higher from college.
- **Percent of Owner-Occupied Householder 65 and Older and Occupied prior to 1980:** This variable is important to show where residents have aged in place and may explain strong bonds with these residents and their

community. These geographies may illustrate Naturally Occurring Retirement Communities (NORCS)—geographically defined areas with high concentrations of older adults that naturally developed because seniors either remained in or moved to these communities when they retired (Hunt, M. E., and Gunter-Hunt, G., 1986). These populations may have characteristics that are conducive to HCBS provision.

- **Percent of Workforce in the Creative Class:** The creative class thesis may be particularly relevant to rural communities, which tend to lose much of their talent when young adults leave. The ERS creative class codes indicate a county's share of population employed in occupations that require creative thinking. This variable will investigate whether the presence of the Creative Class translates to more innovative non-institutional methods of LTC and AIP services.

3.2.3 Environmental Characteristics

A spatial examination of specific county-level environmental characteristics will address their influence on the distribution of AIP establishments and initiatives. The natural environment includes the physical characteristics and amenities found in a county. The built environment encompasses housing patterns, transportation alternatives, and the presence of specific establishments and services that may affect LTC provision. Specific environmental characteristics include

- **Population Density:** The compactness of the people living in a county can generate greater population density (average population per square mile) and

generally will assist in providing goods and services more efficiently. U.S. Census Bureau has several different definitions for urban and rural, including using population density.

- **Percentage of Population 16 and Older Who Walk or Use Public Transportation as Their Means of Transportation to Work:** This variable will explore the overall effectiveness of county public transportation and urban form. The presence of public transportation may counter a need for transportation assistance that many older adults experience through a loss of mobility and automobile access.
- **Number of Physicians per 1,000 Residents:** Small numbers of physicians and geriatricians combined with a growing aging population pose challenges and opportunities for LTC providers. It is important to identify counties with significant deficits in physician care.
- **Number of Employees in Higher Education per 1,000 Residents:** Employment in Higher Education will measure the presence of educational opportunity and will serve to identify counties that possess establishments that cater towards Colleges and Universities. This variable will measure employment in NAICS 611310 (Colleges, Universities, and Professional Schools).
- **Number of Employees in Organizations Promoting Social Capital per 1,000 Residents:** The Petris Social Capital Index (PSCI) will measure potential county social capital levels. This index uses the percentage

employed in religious and community-based organizations within a defined geographic area to measure supply side social capital (Brown et al., 2006). This measure of Community Social Capital (CSC) describes paid workers employed in NAICS 813: (Religious organizations, 8131; Grantmaking and Giving Organizations, 8132; Social Advocacy Organizations, 8133; Civic and Social Organizations, 8134; Business, Professional, Labor, Political, and Similar Organizations, 8139. The Petris Index has been shown to be highly correlated with Putnam's measures of social capital, such as trust (Scheffler and Brown., 2008). Aging in community promotes social capital, a sense of social connectedness that is enhanced over time through positive interactions in shared interests and pursuits (Thomas and Blanchard, 2009).

3.3 Data Sources

The data for this dissertation are predominately drawn from the following national, county-level databases for 2013:

- **County Business Patterns (CBP)** is an annual series provided by the Census Bureau that provides subnational economic data by industry. This series includes the number of establishments, employment during the week of March 12, first quarter payroll, and annual payroll. This data is useful for studying the economic activity of small areas; analyzing economic changes over time; and as a benchmark for other statistical series, surveys, and databases between economic censuses. This data set uses industry classification according to the

current 2012 North American Industry Classification System (NAICS) definitions.

- **The American Community Survey (ACS)** is an ongoing survey conducted by the Census Bureau that provides summary data annually pertaining to economic, social, demographic, and housing information for multiple geographies giving communities the current information they need to plan investments and services. The 5-year estimates from the ACS are "period" estimates that represent data collected over a specific amount of time. The primary advantage of using multi-year estimates is the increased statistical reliability of the data for less populated areas and small population subgroups. The five-year estimates are used because they are considered the most reliable of the ACS data and the only data set available for all counties in the United States (U.S. Census Bureau). The ACS 5-year estimates (2009-2013) will provide much of the socio-economic data analyzed in this dissertation.
- **Area Health Resources Files (AHRF)** System is maintained under contract to the National Center for Health Workforce Analysis (NCHWA), Bureau of Health Workforce within the Health Resources and Services Administration. The Area Resource File (ARF) contains county-level data on health facilities, health professions, measures of resource scarcity, health status, economic activity, health training programs, and socioeconomic and environmental characteristics. All information on the file is derived from existing data sources.

3.4 Data Limitations

The NAICS-based analysis has many advantages for this dissertation since it is based on a national classification system; however, some key data limitations exist within this framework. Non-disclosure rules are present in government economic data sets to ensure the confidentiality of specific firm data when the sample size is too small. This means that full data sets are not always available, and this lack of complete data is more pronounced in smaller geographies. This lack is particularly evident in this dissertation, as many counties do not disclose a full range of NAICS-specific economic data for AIP-related establishments. The County Business Patterns (CBP) data series provides subnational economic data by NAICS industry and is the source of data regarding the number of establishments and employees analyzed in this dissertation. In instances where revealing the number of employees in a particular county may infringe on the confidentiality of specific establishments, the CBP provides a data range. The CBP parses employment into nine data ranges; this dissertation will use the median value of these specific data ranges in applicable cases.

The NAICS framework was designed to facilitate analysis of statistical data describing the economies of the United States, Canada, and Mexico, providing uniformity and comparability in the presentation of data. The macro-scale of NAICS data is conducive for examining larger industry groups but is often too broad for research centered on specific types of industry firms. For instance, NAICS 623311, used to describe Continuing Care Retirement Communities, is broader than definitions used by many LTC research and policy centers such as Leading Age and Ziegler. Additionally,

each establishment is assigned only one NAICS code, based on a firm's primary activity; this assignment can blur data concerning establishments that produce specific goods and services in more than one industry group.

The American Community Survey is the primary data source to understand conditions and trends in rural America, mainly because no other data set provides a sufficient sample size to analyze rural geographies at the county level. Rural counties have smaller populations and therefore are susceptible to larger margins of error. Multi-year estimates are used to counter the potential errors stemming from smaller sample sizes. Although larger margins of error exist within county-level ACS datasets, ACS data is critical for analyzing less populated and rural geographies (Heflin and Miller, 2012).

The data used in this dissertation comes primarily from publicly available government databases at the county level. Limitations of this type of macro-quantitative data include an inability to account for complex decisions involved in choosing goods and services along the Continuum of Care, neglecting individual relationships between health and place. State-level public policy is instrumental in determining government financing levels and regulation of Continuum of Care resources. The majority of LTC is financed through Medicaid, accounting for 62.2% of United States LTC expenditures in 2010 (O'Shaughnessy, 2014). Medicaid programs vary by State, both in terms of per capita spending and eligible LTC settings. States often craft policy that clearly regulates what services can be provided in particular types of LTC establishments and may employ specific licensure requirements. An account of state-level involvement in AIP

opportunity, both as a financer and regulator of Continuum of Care services, is not part of the analysis in this dissertation but is a line of inquiry ripe for future research.

Although, many statistical models may assist in providing insight into the geography of AIP employment, stepwise regression models will be used to explain the statistical relationship between key predictor variables and their influence on AIP employment. Potential flaws in this form of analysis include the ecological fallacy and the Modifiable Area Unit Problem (MAUP). This national investigation is based on data aggregated at the county level. Although the county is most often used to define the geographic market of Long-Term Care (Bowblis, 2012), research at this level is susceptible to spatial methodological concerns. Counties comprising Metropolitan Statistical Areas (MSAs) have a high degree of social and economic integration, influencing the supply of LTC provision and blurring market boundaries. The temporal dimension of the research will also limit results. This research focused solely on the geography of LTC and AIP provision in 2013 and does not account for trends in access that develop over time. The results of this investigation will be described further in Chapter IV.

CHAPTER IV

FINDINGS

4.1 Study Area

The study is conducted at the county level and includes the 3,143 county and county equivalents of the United States. The Nation's 381 Metropolitan Statistical Areas (MSAs), comprising 1,167 counties, are delineated by the Office of Management and Budget (OMB) Bulletin No. 13-01 and investigated in detail. Specific statistical analysis will examine the 436 counties contained in the 52 large MSAs, with populations over one million residents, independently from the 731 counties within the remaining 329 small and medium MSAs. The geographic framework stems from components of the 2013 National Center for Health Statistics' (NCHS) Urban–Rural Classification Scheme for Counties.

Although a national examination of the Long-Term Care (LTC) production system is a part of this research agenda, a primary focus on MSA counties is warranted and particularly fruitful. Roughly 85 percent of the U.S. population resides within a MSA, with 54 percent living inside the 52 large MSAs (OMB, 2013). The geography of total employment for establishments providing LTC generally reflects the spatial distribution of the population of the United States, as 82 percent of all Facility-Based Services (FBS) employees and 88 percent of all Home and Community-Based Services (HCBS) employees are working within a MSA (CBP, 2013). The NCHS urban-rural

scheme categorizes MSA counties by the total population of the MSA, and large MSAs are defined as having over one million residents. Analyzing counties within large MSAs separately from the remaining MSA counties provides a method to account for urbanization-level differences and to identify predictive variables that influence the supply side of the LTC and AIP production system within differing geographies. The urban-rural scheme further identifies large MSA counties as either central or fringe. The 68 large central metro counties are addressed in this research but are not part of the stepwise regression analysis.

4.2 Dependent Variables

The two dependent variables are derived from the American Health Care Association and use North American Industrial Classification System (NAICS) codes to describe the LTC and AIP production system. Absolute employment within Facility-Based Services and Home and Community-Based Services per 1,000 residents will define the LTC workforce. Facility-Based Services include Nursing Care Facilities and Residential Care Facilities, while Home and Community-Based Services describe Home Health Care Services and Services for the Elderly and Persons with Disabilities. The NAICS organizes establishments into industries according to the goods and services they produce, centering on the production process, not the occupational composition of the industry.

It is important to understand that both dependent variables share a similar occupational profile dominated by the direct care workforce and healthcare support occupations such as certified nursing assistants, home health aides, and personal care

aides (BLS, 2014). Licensed professionals including physicians, nurse practitioners, and registered nurses comprise less than 10 percent of LTC employment (BLS, 2014). The direct-care workforce represents over 30 percent of the nation's overall health-care labor force and is one of the fastest growing occupations in the country. Direct-care workers require little education or training and receive low wages; the median hourly wage for all direct care workers in 2012 was $10.63 (PHI, 2014). Although the settings of FBS and HCBS vary considerably in terms of location, size, and specific amenities or specialties of care, establishments dedicated to providing LTC products and services employ a similar labor force.

The dependent variables illustrate the LTC production system at the county level by normalizing the total number of employees in establishments primarily engaged in providing FBS and HCBS per 1,000 residents. The normalization of total employment by population enables a comparison of large urban counties and smaller urban, suburban, or even rural counties. Health-care services are considered a local industry and mainly serve a localized market. Health care and health-care workers are a public necessity and as such are found in almost all counties; they are generally distributed proportionally by population (Delgado et al., 2014). The LTC production system is, however, unequally distributed throughout the United States, with disproportionately large shares or local clusters of LTC employment found in MSA as well as non-MSA counties.

4.2.1 Spatial Distribution of Facility-Based Services

The spatial distribution of LTC employment and Continuum of Care products and services is uneven. Employment in Facility-Based Services per 1,000 county residents is disproportionally located throughout the United States **(Figure 4.1).**

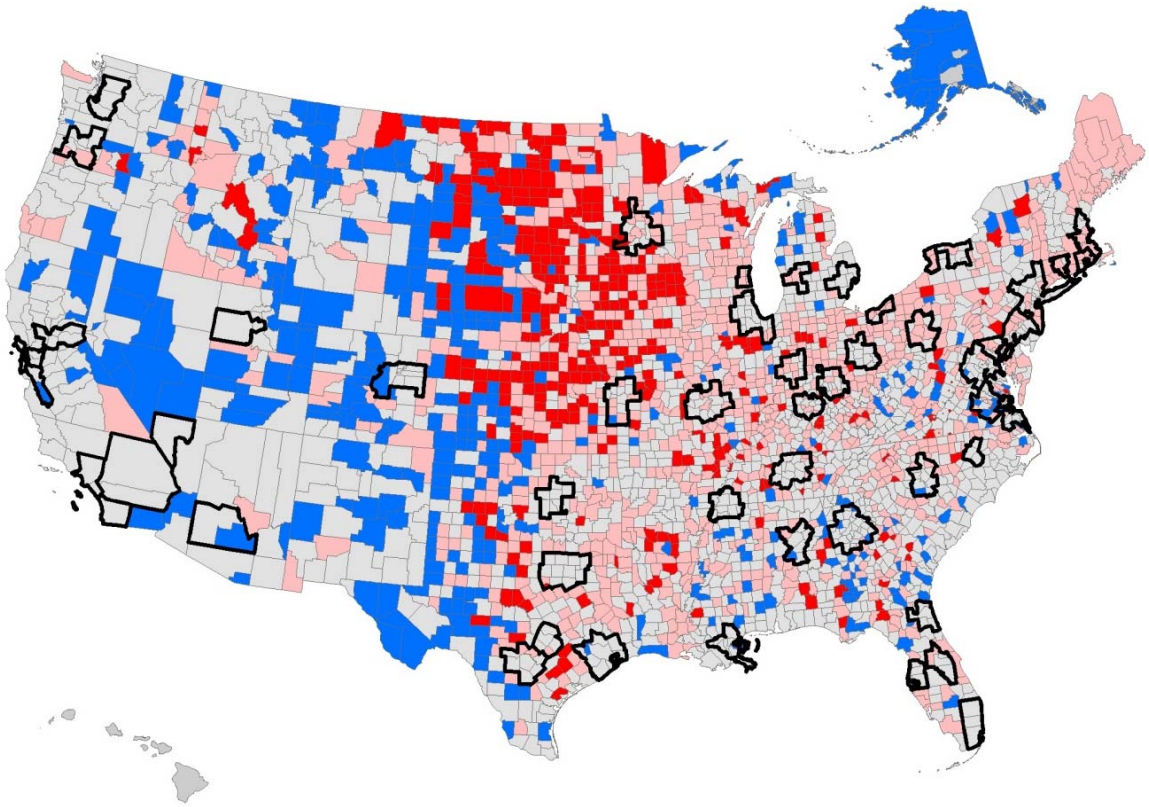

Figure 4.1. Distribution of Employment per 1,000 Residents in Facility-Based Services by County. The mean ($\bar{x}$) for all counties (n=3,143) is 9.93 workers; the standard deviation (sd) is 8.07 workers per 1,000 residents. Large MSA counties are outlined in black.

4.2.1.1 Facility-Based Services, Large MSA Counties

The average county in a large MSA has 7.75 workers employed in Facility-Based Services per 1,000 residents, varying from a high of 40 workers per 1,000 residents in Fairfax city, Virginia. San Benito County, California has 0.18 workers per 1,000 residents, the lowest of 422 large MSA counties reporting employment in Facility-Based Services. Large MSAs had 187 counties that exceed the mean for the Facility-Based employment per 1,000 residents, while 14 counties reported zero workers in FBS establishments.

The Facility-Based Services county rankings **(Table 4.1)** reveal counties that have disproportionately high shares of FBS employment and illustrate the specific NAICS composition. Facility-Based Services are comprised of establishments that primarily provide medical services (Nursing Care Facilities: NAICS 62311) and those that chiefly deliver non-medical services (Residential Care Facilities: NAICS 62331). The FBS county rankings for large MSAs show that the highest rates of FBS employment are comprised of varying proportions of workers from the two major types of FBS establishments.

Table 4.1. Large Metropolitan Counties (MSAs > 1 Million) Ranked by Total Employment in Facility-Based Services per 1,000 Residents (n=436).

Rank	Large Metropolitan County	F B S: EMP / 1K POP	F B S: Total EMP	62311 / 1K POP	EMP 62311	62331 / 1K POP	EMP 62331	Population Thousands
1	Fairfax city, Virginia	39.997	921	37.391	861	2.606	60	23.027
2	Sibley County, Minnesota	23.108	350	11.554	175	11.554	175	15.146
3	Gallatin County, Kentucky	20.528	175	20.528	175	0	0	8.525
4	Somervell County, Texas	20.499	175	20.499	175	0	0	8.537
5	Colonial Heights city, Virginia	20.022	350	10.011	175	10.011	175	17.481
6	Hopewell city, Virginia	19.395	435	16.719	375	2.675	60	22.429
7	Montgomery County, Pennsylvania	17.893	14397	9.094	7317	8.799	7080	804.621
8	Mille Lacs County, Minnesota	17.588	456	14.464	375	3.124	81	25.927
9	Jersey County, Illinois	17.505	400	16.411	375	1.094	25	22.85
10	Kendall County, Texas	17.052	596	12.045	421	5.007	175	34.951
11	****Pinellas County, Florida**	16.841	15494	10.718	9861	6.123	5633	920.015
12	****Hartford County, Connecticut**	16.597	14868	13.004	11649	3.593	3219	895.827
13	Bristol County, Rhode Island	16.429	812	12.888	637	3.541	175	49.426
14	Williamsburg city, Virginia	16.119	235	12.004	175	4.116	60	14.579
15	Washington County, Wisconsin	16.076	2125	2.837	375	13.239	1750	132.186
16	Baltimore County, Maryland	15.911	12924	7.227	5870	8.684	7054	812.261
17	Lake County, Ohio	15.51	3565	7.896	1815	7.614	1750	229.85
18	Scott County, Indiana	15.353	369	14.937	359	0.416	10	24.035
19	Trousdale County, Tennessee	15.3	120	7.65	60	7.65	60	7.843
20	Carroll County, Maryland	15.27	2554	5.967	998	9.303	1556	167.261
21	James City County, Virginia	14.962	1020	2.567	175	12.395	845	68.171
22	Henrico County, Virginia	14.93	4648	8.04	2503	6.89	2145	311.314
23	Clinton County, Missouri	14.764	305	14.279	295	0.484	10	20.659
24	Geauga County, Ohio	14.71	1377	9.401	880	5.309	497	93.61
25	Middlesex County, Connecticut	14.678	2432	10.496	1739	4.183	693	165.69
	Average	**7.748**	**2936**	**5.427**	**1917**	**2.32**	**1019**	**393.534**
	Standard Deviation	**4.214**	**5105**	**3.564**	**3554**	**2.105**	**1772**	**753.897**

Yellow Highlight >= 1 standard deviation above Large Metropolitan mean. **Blue Highlight** < 1 standard deviation below the Large Metropolitan mean. FBS: Facility-Based Services, 62311: NAICS Code for Nursing Care Facilities, 62331: NAICS Code for Residential Care Facilities. Source ACS 2009-2013.
**** denotes Central County**

There are two counties among the top twenty-five that fall below the large MSA mean for employees in Nursing Care Facilities per 1,000 residents; five top twenty-five counties fall below the large MSA mean for employment per 1,000 residents in Residential Care Facilities. Washington County and James City County fall roughly 0.75 standard deviations below the employment rate mean in Nursing Care Facilities. Gallatin County, Somervell County, Jersey County, Scott County, and Clinton County hold employment rates in Residential Care Facilities that are below the large MSA mean, with Gallatin County (ranked 3rd) and Somervell County (ranked 4th), more than one standard deviation under the mean and reporting zero workers. Six counties in the top twenty-five are more than one standard deviation above the mean for both FBS employment rates including Sibley County (ranked 2nd), Colonial Heights city (ranked 5th), Montgomery County (ranked 7th), Kendall County (ranked 10th), Pinellas County (ranked 11th), and Geauga County (ranked 24th).

Counties ranked in the FBS top twenty-five are geographically dispersed over 18 MSAs. The Richmond, VA, MSA contains three top twenty-five counties (Colonial Heights city, Hopewell city, and Henrico County). Five MSAs (Virginia Beach-Norfolk-Newport News, VA-NC; Minneapolis-St. Paul-Bloomington, MN-WI; Hartford-West Hartford-East Hartford, CT; Baltimore-Columbia-Towson, MD; and Cleveland-Elyria, OH) contain two top twenty-five counties. Furthermore, six FBS top twenty-five counties are concentrated in the Commonwealth of Virginia including Fairfax city (ranked 1st), Colonial Heights city (ranked 5th), Hopewell city (ranked 6th), Williamsburg city (ranked 14th), James City County (ranked 21st), and Henrico County (ranked 22nd).

The political geography of Virginia is highly influenced by independent cities, which the Census Bureau and OMB designate as county equivalents. Independent cities are not politically part of a county, even though geographically they may be completely contained in one, and may even serve as the county seat of an adjacent county. There are 41 independent cities in the United States, of which 38 are in Virginia; the three outside of Virginia include Baltimore, Maryland; St. Louis, Missouri; and Carson City, Nevada (OMB, 2013). These unique administrative units maintain close socio-economic connections with their surrounding counties but are considerably smaller in size and population, a situation which may influence a county-level statistical analysis.

Fairfax city has the highest rate (40) of FBS employment per 1,000 residents for large MSA counties–7.7 standard deviations above the mean and considerably higher than Sibley County (ranked 2nd), which has 23.1 FBS employees per 1,000 residents. Fairfax city is part of the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA and has a population of just over 23,000, well below the large MSA county mean of approximately 394,000. Fairfax city, spanning only 6.3 square miles, is completely contained within Fairfax County, which has a population over 1 million residents. Fairfax city is affluent and shares many socio-economic traits with Fairfax County but possesses a much less populated, though far denser, urban environment. The median home value ($456,700) and median household income ($97,242) are both more than two standard deviations above the mean for large MSA counties. The population is highly educated, with over 50% of residents over 25 holding a Bachelor's Degree. The City of Fairfax has a large foreign-born (25%) and Asian (16%) population, all more than two

standard deviations above the large MSA county mean. The Petris Social Capital Index (PSCI) value, which measures employment in community-based organizations, is approaching 45, nearly five standard deviations above the mean. Fairfax city has close ties with the Greater Washington D.C. Metropolitan area and an extremely high rate of FBS employment per 1,000 residents that can be attributed in large part to high employment in Nursing Home establishments relative to a low county population.

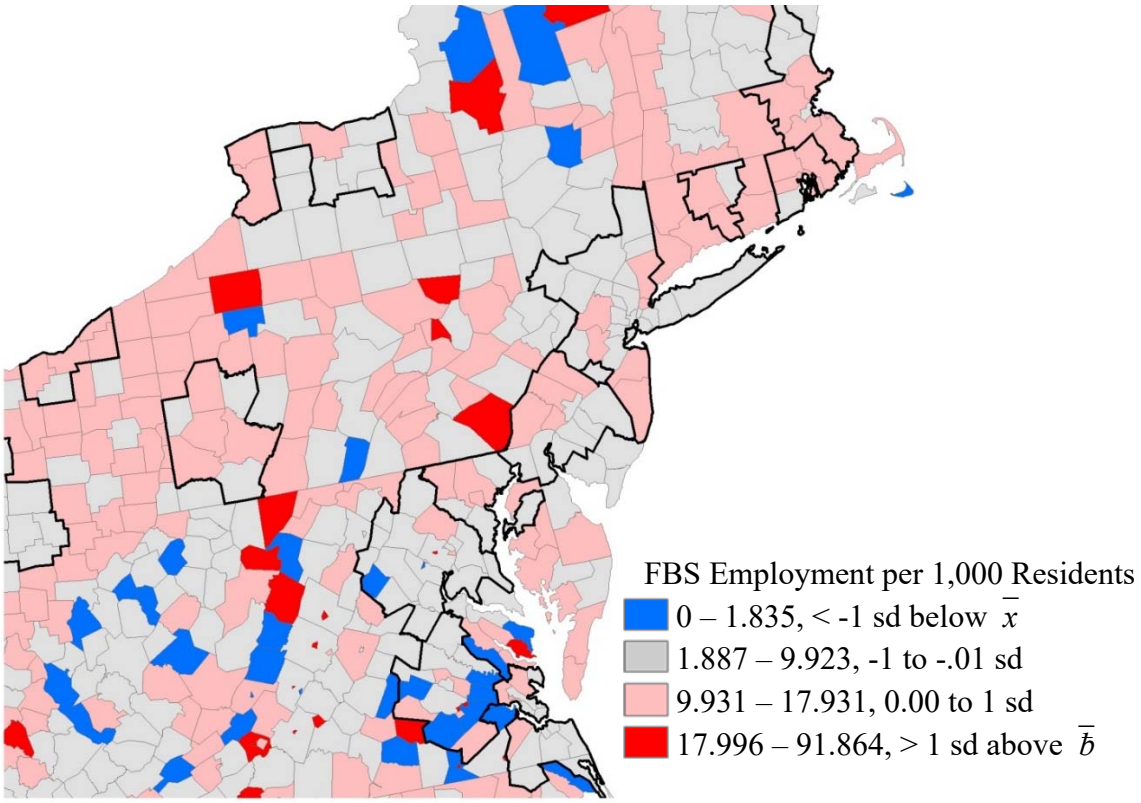

Figure 4.2. Distribution of Employment per 1,000 Residents in Facility-Based Services by County, Northeast United States. Large MSA counties are outlined in black.

Area Agencies on Aging (AAAs) provide a comprehensive array of services to older populations throughout the country, responding to the specific needs of their

communities. There are 25 Planning & Service Areas throughout the Commonwealth of Virginia (V4A, 2016). The Fairfax County Area Agency on Aging provides options that allow older adults to choose the HCBS and living arrangements that suit them best, enabling older adults to age in their homes and communities. Fairfax city participated in the Fairfax County Community Action Plan, adopted in 2014, which includes 31 initiatives regarding housing, transportation, community engagement, safety and health services, and long-range planning. Elevated FBS employment in Fairfax city is linked to the broad array of programs and services provided by the Fairfax County Services for Older Adults. Although Nursing Homes are responsible for the overwhelming majority of LTC employment in Fairfax city, the Residential Care workforce is also above the large MSA mean.

Three counties in the Richmond, VA MSA are part of the FBS top twenty-five including Colonial Heights city (ranked 5th), Hopewell city (ranked 6th), and Henrico County (ranked 22nd), making this MSA the most represented MSA in the FBS rankings. Situated 100 miles south of Washington, D.C., the Richmond metro area is a transportation hub, enjoying extensive highway and rail access. Anchored by the Virginia Commonwealth University Medical Center and Medical College of Virginia Hospitals, residents of the Richmond metro area are afforded access to the most modern medical services available. The Richmond MSA offers a wide range of cultural attractions reflecting the area's rich history as well as excellent outdoor recreation opportunities.

Comparable geographically, the independent cities of Colonial Heights and Hopewell contain approximately eight and eleven square miles of land respectively. They are located roughly 20 and 25 miles south of Richmond along the Appomattox River, Hopewell is situated at its confluence with the James River (US Census Bureau, 2013). Colonial Heights and Hopewell are both home to approximately 20,000 residents, far below the large MSA county mean of 393,534. Henrico County is considerably larger, bounding Richmond city on three sides, with a population of approximately 311,314. Two AAAs serve the Richmond MSA: The Crater District Area Agency on Aging provides services to Colonial Heights city and Hopewell city; Senior Connections-Capital Area Agency on Aging, Inc., supports Henrico County seniors in maintaining a high quality of life and independence as they age.

Colonial Heights city and Hopewell city possess specific population measures that are associated with elevated FBS demand. The cities of Colonial Heights (3.2%, 2.7 standard deviations above the large MSA mean) and Hopewell (2.5%, 1.5 standard deviations above the large MSA mean) have above-average percentages of residents 85 and older, the segment of the population that most requires continuum-of-care services. Over 15 percent of households in Colonial Heights city (2.8 standard deviations above the large MSA mean) and almost 13 percent in Hopewell city (1.6 standard deviations above the large MSA mean) are comprised of someone 65 or older and living alone, indicating a present and future need for AIP goods and services. Most LTC is provided by informal caregivers, usually immediate family members. The Informal Caregiver Support Ratio (ICSR) measures the supply of potential informal caregivers (Redfoot,

Feinberg and Houser, 2013). Colonial Heights (4.2) and Hopewell city (5) have low ICSR values, both more than one standard deviation below the large MSA county mean, indicating an informal care gap and populations that will likely require formal LTC resources.

Colonial Heights is particularly well equipped to provide continuum-of-care services because of its above-average supply of physicians (2.4 standard deviations above the large MSA mean) per 1,000 residents. FBS employment per 1,000 residents in Colonial Heights (20) is well balanced; it is one of six large MSA counties with employment in both Residential Care and Nursing Home Facilities per 1,000 residents that is over one standard deviation above the mean. FBS employment per 1,000 residents in Hopewell city (19.4) is proportioned heavily (85% of FBS workers) towards Skilled Nursing Facilities. Top FBS employers in the Cities of Colonial Heights and Hopewell include Colonial Heights Health Care and Rehabilitation Center, Care Advantage, and Hopewell Health Care Center.

Henrico County (312,000) has the second highest population in the Richmond MSA, behind Chesterfield County (320,430), and is the and the sixth most populous county equivalent in Virginia. FBS employment per 1,000 residents (14.9) in Henrico County is composed almost equally of those working in Nursing Homes (2,503) and those employed in a Residential Care Facility (2,145). While employment per 1,000 residents for the two specific FBS classifications are both well above average, the Residential Care Facility component is particularly high (over 2 standard deviations above the large MSA mean). There are many Skilled Nursing Facilities in Henrico

County that offer a complete range of intermediate and skilled-care including the Henrico Health & Rehabilitation Center. In addition to Nursing Homes, there are many Assisted Living Facilities and CCRCs. Westminster Canterbury Richmond is a particularly large CCRC with over 800 units (Ziegler, 2015). Founded in 1971 by the Episcopal and Presbyterian churches as a faith-based charitable organization, Westminster Canterbury Richmond was the first among Richmond-area retirement communities to earn accreditation by the Continuing Care Accreditation Commission (now CARF-CCAC), the independent authority that evaluates all aspects of a Continuing Care Retirement Community (CCRC).

Williamsburg city (ranked 14th) and James City County (ranked 23rd) are located within the Virginia Beach-Norfolk-Newport News, VA-NC MSA. Williamsburg is strategically located on the Virginia Peninsula in the southeastern portion of the state. Tourism is a strong component of the local economy, which is well known for its historical architecture, landmarks and living history–most notably Colonial Williamsburg, which replicates life in 18th century Colonial America. Williamsburg city possesses the youngest population of the 436 large MSA counties; the median age is 24, more than four standard deviations below the large MSA county mean. The young population of Williamsburg is needed to fill many of the jobs in the tourist and accommodation industry. The PSCI value (23), describing supply side community social capital, is nearly two standard deviations above the mean for large MSA counties, benefiting from the many social and civic organizations that preserve and celebrate

Williamsburg's cultural legacy. Williamsburg has relatively balanced FBS employment, with a labor force above the mean for both types of FBS.

James City County, adjacent to Williamsburg city at the head of the Virginia Peninsula, has a unique FBS composition. Contrary to most of the FBS large MSA top twenty-five, James City County is below the mean for Nursing Home employment. However, the Residential Care workforce per 1,000 county residents is 4.8 standard deviations above the large MSA county mean. James City County has a large concentration of physicians (2.2 standard deviations above the large MSA mean), providing its residents ample healthcare choice. There are a variety of Residential Care Facilities and Continuing Care Retirement Communities in James City County including Chambrel at Williamsburg, Patriot's Colony, The Village at Ford's Colony, Windsor Meade, and Williamsburg Landing. These facilities offer all levels of care including independent and assisted living as well as memory care. There is a particularly noteworthy difference in the median age of Williamsburg city (24) and James City County (45), a gap spanning over 20 years and almost six standard deviations. A highly skilled and educated labor pool is often a good barometer of AIP opportunity; James City County has an abundance of institutions of higher learning, research labs, military facilities, and tourism organizations.

Sibley County (ranked 2nd) and Mille Lacs County (ranked 8th) are part of the Minneapolis-St. Paul-Bloomington, MN-WI MSA, which is well served by Continuum of Care providers (Ziegler, 2015). The Minnesota River Area Agency on Aging serves Sibley County, and the Central Minnesota Council on Aging assists Mille Lacs County.

With over 13 percent of households comprised of a resident 65 or older and living alone (2 standard deviations above the large MSA mean), a substantial portion of Sibley County's population may soon require continuum-of-care services. A counter to this potential vulnerability, Sibley County has an above average ICSR (1.2 standard deviations above the large MSA county mean) and a Petris Social Capital Index Score that is over two standard deviations above the large MSA county mean, illustrating community support organizations that are essential for Aging in Place.

Both Minnesota counties have above-average concentrations of residents 85 and older, more than 1.5 standard deviations above the large MSA county mean for this age cohort. FBS employment per 1,000 residents (23.1) in Sibley County is over 3.6 standard deviations above the mean for large MSA counties. Largely influenced by high levels of employment in Residential Care Facilities, Sibley County is one of six large MSA counties to possess rates of employment per 1,000 residents over one standard deviation above the mean for both FBS classifications. FBS employment per 1,000 residents in Mille Lacs County (17.6) is 2.3 standard deviations above the large MSA county mean and mainly attributed to a large Nursing Care Facility workforce. The Minneapolis-St. Paul-Bloomington, MN-WI MSA, Sibley and Mille Lacs Counties specifically, are served by many of the nation's largest multi-site senior living providers including The Presbyterian Homes, Inc., Ecumen, Elim Care Inc., and Sholom Community Alliance (Ziegler, 2015).

Generally, health services are designed to meet the needs of the local market, with employment proportional to the surrounding population. However, a closer look at

population data reveals that only four counties in the top twenty-five FBS rankings are above the large MSA county population mean (393,534). The same four counties (Montgomery County, Pinellas County, Hartford County, and Baltimore County) are the only counties in the top twenty-five to have absolute employment in FBS establishments over one standard deviation above the mean.

Montgomery County, Pennsylvania (ranked 7th) has a well-balanced FBS employment workforce per 1,000 residents (17.9), approximately 7,000 workers in each classification of FBS establishments, which are both over one standard deviation above the large MSA county mean. Montgomery County is a suburban county northwest of Philadelphia with a population of approximately 805,000 and an above average proportion of residents 85 and older (1.7 standard deviations above the large MSA mean). The suburban county is a major employment center and has a large healthcare workforce, which includes an abundance of physicians (2.2 standard deviations above the large MSA county mean). Montgomery County is home to and serviced by some of the country's largest FBS providers (Ziegler, 2015) including Complete Health Care Resources-Eastern, Inc., the 33rd largest Nursing Facility in in the United States (Oberst, 2015). Montgomery County is also home to the Masonic Village at Lafayette Hill, which embraces innovative principles and person-centered care.

The NCHS Urban-Rural Classification Scheme designates 68 counties as large central metro counties, but only Pinellas County and Hartford County appear in the FBS top twenty-five. These overwhelming urban counties contain large percentages of residents 85 and older (Pinellas, 3.5%; Hartford, 2.6%) and are served by multiple large

FBS providers. Pinellas County (ranked 11th) is in the Tampa-St. Petersburg-Clearwater, FL MSA and has a population of approximately 920,000. A popular retirement location, Pinellas County attracts older adults from other parts of the country.

Many older adults who relocate to Florida in retirement are forced to cultivate new social networks and methods of civic participation, and 16 percent of households are comprised of a resident 65 or older and living alone (3.1 standard deviations above the large MSA county mean). Pinellas County has an ICSR that is more than 1.3 standard deviations below the large MSA county mean; when there are no family or close friends to provide informal care, demand of formal continuum-of-care services will increase (Van Houtven and Norton, 2004). Large Continuing Care Retirement Communities (CCRCs), including St. Mark Village in Palm Harbor and Mease Manor Retirement Community, influence FBS employment in Pinellas County (Ziegler, 2015). CCRCs provide a range of residential options along the full continuum of care, which encompass independent living, assisted living, skilled nursing, and memory care. Pinellas County has a rate of FBS employment per 1,000 residents (16.8) that is well balanced and derived from large employment clusters in both Skilled Nursing and Residential Care Facilities.

Hartford County (ranked 12th) and Middlesex County (ranked 25th) possess FBS employment rates of 16.6 and 14.7 workers per 1,000 residents and comprise two of the three counties of the Hartford-East Hartford, CT MSA. Hartford County, designated as the large central metro county for the Hartford-West Hartford-East Hartford, CT MSA, contains a population of approximately 896,000. Athena Health Care Systems and iCare

Management, which contain over 5,000 and 1,400 skilled nursing beds respectively, are headquartered in Hartford County and provide LTC services in facilities across Greater Hartford and New England (Oberst, 2015). The large aged population of Middlesex County directly benefits from large FBS providers based in Harford County. Middlesex County has a population of approximately 166,000, where 2.7 percent are 85 and older. The residents of Middlesex County are well educated: over 39 percent of residents over 25 hold a bachelor degree, and employment in institutions of higher education per 1,000 residents is 1.7 standard deviations above the large MSA county mean.

Baltimore County (ranked 18th), with a population just over 812,000, and Carroll County (ranked 20th), which has approximately 167,000 residents, are part of the Baltimore-Columbia-Towson, MD MSA. Baltimore County and Carroll County have FBS employment rates of 15.9 and 15.3 workers per 1,000 residents respectively, derived from relatively balanced proportions of employment in Nursing Homes and Residential Care Facilities. Charleston Retirement Community and Oak Crest Village are large CCRCs in Baltimore County that each contain more than 1,800 units; Lutheran Village in Carroll County contains over 500 units. These communities are primarily dedicated to independent living but also provide assisted living units and skilled nursing beds (Zeigler, 2015).

A large percentage of residents 85 and older in Baltimore County (1.7 standard deviations above the large MSA county mean) creates an opportunistic climate for establishments that provide continuum-of-care goods and services. The Baltimore County Government contains a Department of Aging that promotes successful aging by

providing resources and challenging negative stereotypes. Many FBS establishments in Baltimore County have embraced aspects of the Eden Alternative and Culture Change movements, advocating person-centered care and resident choice. Levindale Hebrew Geriatric Center and Hospital, the first registered Eden Alternative center in Maryland, is implementing the Neighborhood Model of nursing home care and design.

Lake County (ranked 17th) and Geauga County (ranked 24th) are in the Cleveland-Elyria, OH MSA, a region known for quality health care and the renowned Cleveland Clinic. The FBS labor force in these counties is relatively balanced, though employment in Skilled Nursing Facilities comprises a larger proportion of total FBS employment per 1,000 residents in Lake County (15.5) and Geauga County (14.7). The Western Reserve Area Agency on Aging serves the Cleveland metro area and provides support to individuals needing continuum-of-care resources.

Low populations significantly affect many of the top FBS employment rates for large MSA counties; 21 counties in the FBS top twenty-five rankings have populations below the mean. Gallatin County (ranked 3rd) and Somerville County (ranked 4th) have FBS employment rates of approximately 20.5 workers per 1,000 residents and populations of approximately 8,500; only eight large MSA counties have fewer residents. Trousdale County (ranked 19th) is the least populated county (7,843) in the FBS top twenty-five for large MSA counties. Gallatin County and Somervell County stand out as the only counties in the large MSA FBS rankings to report zero workers for a specific FBS NAICS category; both counties have zero employment in Residential Care Facilities. Nationally, Skilled Nursing Facilities are more common than Residential Care

Facilities and employ many more workers (BLS, 2014). Many of the FBS employment rates in the large MSA county top twenty-five can be attributed to workers employed by Skilled Nursing Facilities in counties with relatively low populations.

4.2.2 Spatial Distribution of Home and Community-Based Services

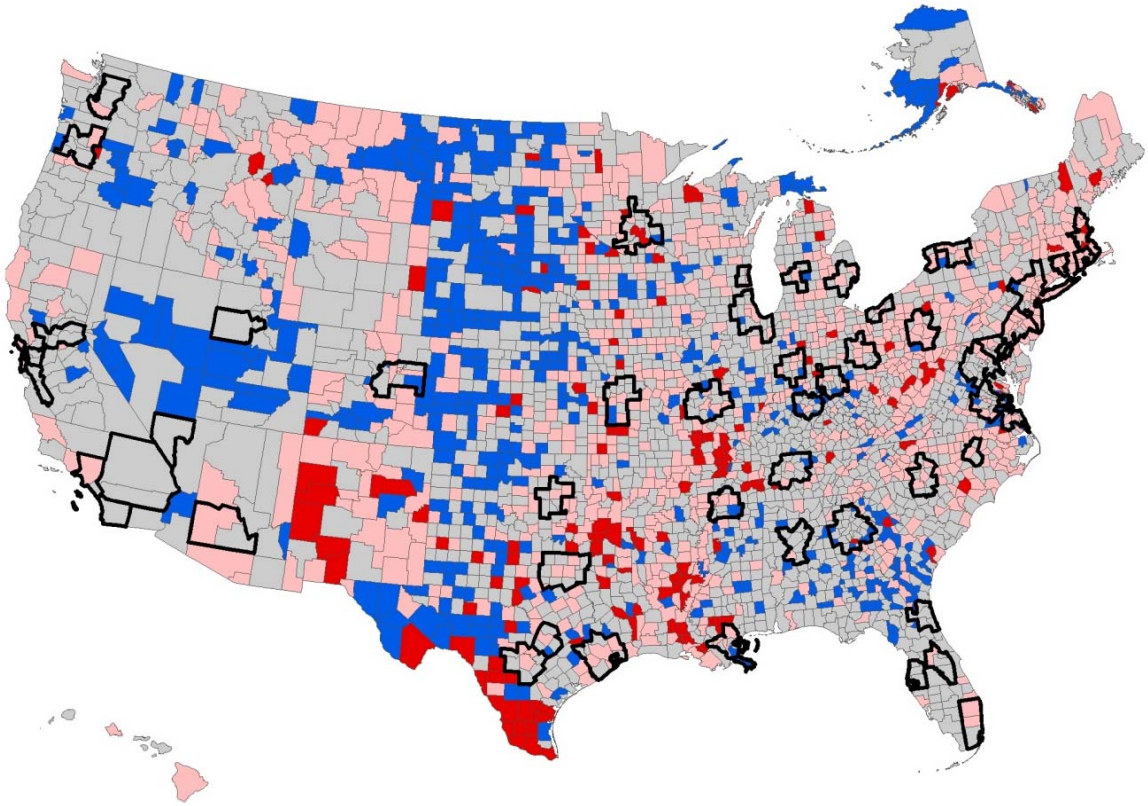

Figure 4.3. Distribution of Employment per 1,000 Residents in Home and Community-Based Services by County. The mean ($\bar{x}$) for all counties (n=3,143) is 5.54 workers; the standard deviation (sd) is 9.96 workers per 1,000 residents. Large MSA counties are outlined in black.

The spatial distribution of employment dedicated to Home and Community-Based Services is comparable to Facility-Based employment in the United States. There are however, noticeable differences between the geographies of the two Long-Term Care classifications. Concentrations of counties with high levels of employment in HCBS per 1,000 residents are unevenly spread across the country **(Figure 4.3)**.

4.2.2.1 Home and Community-Based Services, Large MSA Counties

The average county in a large MSA has 5.41 workers employed in Home and Community-Based Services per 1,000 residents, varying from a high of 62.21 workers per 1,000 residents in Falls Church city, Virginia. Pike County, Pennsylvania, reports 0.18 workers per 1,000 residents, the lowest of 416 large MSA counties reporting HCBS employment. There are 158 counties that exceeded the employment mean, and 20 that reported zero Home and Community-Based firms or employees.

The Home and Community-Based Services county rankings **(Table 4.2)** illustrate where disproportionate levels of county HCBS employment exist relative to the total county population. Like Facility-Based Services, HCBS are further classified by specific NAICS designations. Home Health Care Services (NAICS 62161) primarily deliver medical care; common providers include Home Health Agencies and Visiting Nurse Associations. Services for the Elderly and Persons with Disabilities (NAICS 62412) largely administer non-medical home-based care in Adult Day Centers or Senior Activity Center settings.

The HCBS county rankings for large MSAs show that the highest rates of HCBS employment per 1,000 residents are composed of varying proportions of workers

employed within the two NAICS designated HCBS establishments. Three of the top twenty-five counties rank below the mean for total employees in Home Health Care Services per 1,000 residents including Sussex County, Amelia County, and Floyd County, with Sussex County (ranked 17th) reporting zero workers. Ten counties in the top twenty-five are more than one standard deviation above the mean for both HCBS employment rates per 1,000 residents including Falls Church city (ranked 1st), Bristol County (ranked 2nd), Fairfax city (ranked 3rd), New York County (ranked 4th), Kings County (ranked 7th), Ramsey County (ranked 9th), Hennepin County (ranked 10th), Essex County (ranked 11th), Denver County (ranked 20th), and Rockland County (ranked 22nd).

The HCBS top twenty-five county rankings demonstrate a stronger positive relationship with total population and absolute employment than FBS top twenty-five counties. Data describing HCBS top twenty-five counties in large MSAs show 15 counties rank above the population mean, and 13 possess absolute employment values for HCBS that are one standard deviation above the mean. There is a noticeable presence of higher populated counties in the HCBS top twenty-five. While the FBS large MSA rankings did not include any counties over one million in population, HCBS rankings illustrate eight counties with over one million residents including New York County, Kings County, Hennepin County, Bronx County, Queens County, Franklin County, Bexar County, and Cuyahoga County.

Table 4.2. Large Metropolitan Counties (MSAs > 1 Million) Ranked by Total Employment in Home and Community-Based Services per 1,000 Residents (n=436).

Rank	Large Metropolitan County	HCBS: EMP / 1K POP	HCBS: Total EMP	62161 / 1K POP	EMP 62161	62412 / 1K POP	EMP 62412	Population Thousands
1	Falls Church city, Virginia	62.21	792	42.652	543	19.559	249	12.731
2	Bristol County, Rhode Island	42.994	2125	7.587	375	35.406	1750	49.426
3	Fairfax city, Virginia	34.916	804	21.887	504	13.028	300	23.027
4	****New York County, New York**	34.876	55985	26.96	43278	7.916	12707	1605.272
5	Norfolk County, Massachusetts	30.077	20371	4.239	2871	25.838	17500	677.296
6	Spalding County, Georgia	28.214	1806	3.999	256	24.215	1550	64.011
7	****Kings County, New York**	26.711	67840	19.287	48985	7.424	18855	2539.789
8	Colonial Heights city, Virginia	24.083	421	20.651	361	3.432	60	17.481
9	****Ramsey County, Minnesota**	23.91	12331	16.417	8467	7.492	3864	515.732
10	****Hennepin County, Minnesota**	20.4	23881	11.314	13245	9.086	10636	1170.623
11	Essex County, Massachusetts	20.133	15116	6.937	5208	13.196	9908	750.808
12	Dakota County, Minnesota	17.961	7226	5.021	2020	12.94	5206	402.306
13	****Bronx County, New York**	15.312	21395	10.076	14079	5.236	7316	1397.315
14	****Queens County, New York**	15.073	34010	11.113	25076	3.959	8934	2256.4
15	****Milwaukee County, Wisconsin**	15.02	14277	6.384	6068	8.636	8209	950.527
16	****Franklin County, Ohio**	14.71	17385	11.585	13692	3.125	3693	1181.824
17	Sussex County, Virginia	14.575	175	0	0	14.575	175	12.007
18	Amelia County, Virginia	14.553	185	0.787	10	13.767	175	12.712
19	****St. Louis city, Missouri**	14.457	4611	6.459	2060	7.998	2551	318.955
20	****Denver County, Colorado**	13.733	8505	7.634	4728	6.099	3777	619.297
21	****Bexar County, Texas**	13.703	24025	9.05	15866	4.654	8159	1753.238
22	Rockland County, New York	12.962	4084	6.681	2105	6.281	1979	315.069
23	Floyd County, Indiana	12.926	971	2.942	221	9.984	750	75.12
24	St. Louis County, Missouri	12.576	12573	6.507	6505	6.07	6068	999.725
25	****Cuyahoga County, Ohio**	12.435	15824	8.199	10434	4.236	5390	1272.533
	Average	**5.41**	**2974**	**3.028**	**1833**	**2.382**	**1141**	**393.534**
	Standard Deviation	**5.683**	**7308**	**3.588**	**5032**	**3.246**	**2632**	**753.897**

Yellow Highlight >= 1 standard deviation above Large Metropolitan mean. HCBS: Home and Community-Based Services, 62161: NAICS Code for Home Health Care Services, 62412: NAICS Code for Services for Elderly & Disabilities. Source ACS 2009-2013. **** denotes Central County**

Counties ranked in the HCBS top twenty-five are geographically spread over 14 MSAs. The New York-Newark-Jersey City, NY-NJ-PA MSA contains five top twenty-five counties (New York County, Kings County, Bronx County, Queens County, and Rockland County), the most of any MSA in the HCBS rankings. Other well represented large metropolitan areas include the Richmond, VA MSA (Colonial Heights city, Sussex County, and Amelia County), and Minneapolis-St. Paul-Bloomington, MN-WI MSA (Ramsey County, Hennepin County, and Dakota County), which each have three counties in the HCBS top twenty-five. Three MSAs (Washington-Arlington-Alexandria, DC-VA-MD-WV, Boston-Cambridge-Newton, MA-NH, and St. Louis, MO-IL) contain two top twenty-five counties.

The New York-Newark-Jersey City, NY-NJ-PA MSA is particularly well suited for HCBS provision; five counties in the HCBS top twenty-five including New York County (ranked 4th), Kings County (ranked 7th), Bronx County (ranked 13th), Queens County (14th), and Rockland County (ranked 22nd) are contained within this MSA. Of these five counties, all but Rockland County are regarded as a large central county by the NCHS classification scheme. In addition to large HCBS employment rates per 1,000 residents, these four large central counties in the New York MSA possess high absolute HCBS employment, distinguishing them within the HCBS top twenty-five. In fact, Kings County (ranked 1st), New York County (ranked 3rd), Queens County (ranked 6th), and Bronx County (ranked 11th) hold absolute employment values that exceed 2.5 standard deviations above the large MSA county mean.

The New York metro area is unique and incomparable to other large MSAs; its high population densities fuel an unmatched demand for HCBS, affording extraordinary opportunities to providers of home-based care. The most populated MSA and the nation's financial capital, metro New York, has an extraordinarily diverse population that is served by an extensive public transit system. The NYC metro area contains excellent museums and institutions of higher learning, access to premium health care, and esteemed age-friendly programs and initiatives (Henderson, 2010).

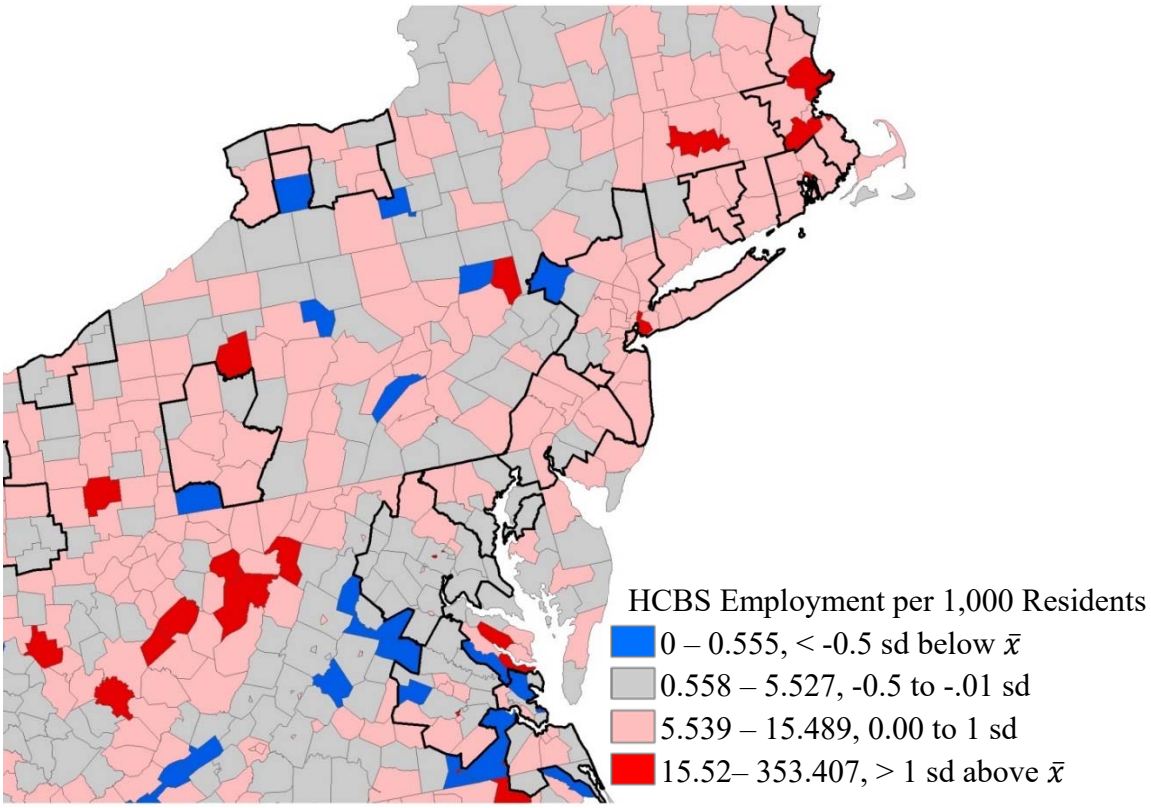

Figure 4.4. Distribution of Employment per 1,000 Residents in Home and Community-Based Services by County, Northeast United States. Large MSA counties are outlined in black.

The New York City Department for the Aging (DFTA or the Department) is the largest agency in the federal network of Area Agencies on Aging (AAA) in the United States. The Department serves the elderly residents of New York City by fostering the equitable provision of services for older adults and acting as an advocate on legislative and policy issues. As a City government agency, DFTA contracts with local community-based organizations to provide programs and services throughout the five boroughs of New York City. Essential services administered by DFTA include meals at senior centers, home-delivered meals, home-based care, transportation, and legal services (Corrado, 2016).

Age-Friendly NYC is New York City's comprehensive plan to identify and improve its age-friendly policies and services that directly affect the growing population of seniors. It serves as a roadmap for cultivating livability and functionality for older residents by addressing four specific themes: community and civic participation, housing, public spaces and transportation, and health and social services. Age-friendly NYC facilitates dialogue between policy makers and older New Yorkers and aims to create and implement public policy initiatives that enhance civic participation (Bloomberg and Quinn, 2009).

The New York metropolitan area is well served by older-adult programs and has many home health-care providers and highly rated nursing homes. A specific example of a LTC provider in New York that has received recognition for its commitment to the key principles of AIP and Aging in Community is The New Jewish Home, a nonprofit that addresses the evolving needs of older residents along the full continuum of care.

Established in 1848 to serve the City's Jewish population, The New Jewish Home utilizes culture-change care philosophies to provide patient-centered LTC to New Yorkers of all faiths and offers independent living senior apartments, assisted living units, and skilled nursing units. These senior living options allow residents to choose an appropriate level of service. The skilled nursing facilities operated by the New Jewish Home include innovative Small Houses and Greenhouses, promoting the idea that Aging in Place can occur in the home or in a facility that provides the right level of care (NJH, 2016).

The geography of New York is particularly well suited for HCBS, and The New Jewish Home offers comprehensive and wide-ranging services across the metropolitan area. Rather than move, many New Yorkers choose to continue to live in their homes and communities as they age. The Jewish Home provides supportive services to make aging in place more viable for New Yorkers living in naturally occurring retirement communities (NORCs). Each NORC community is unique and requires specific HCBS. The New Jewish Home has partnerships with several NORC communities to promote healthy living by providing health assessments, referrals, health education, and screenings to residents.

Densely populated geographies allow HCBS to be administered more efficiently, particularly Home Health Care Services (NAICS 62161). New York County (70,919), Kings County (36,228), Bronx County (33,455), and Queens County (20,941) are the four most densely populated (residents per square mile) counties in the United States and constitute four of the five Burroughs of New York City. Walkable neighborhoods and access to public transportation, products of high population density and compact urban

form, are staples of the New York City landscape. As such, New York County (80%), Kings County (70%), Bronx County (67%), and Queens County (57%) have the largest percentages of MSA county residents that walk or use public transit as their means to and from work.

The New York metropolitan area is the most prominent point of entry for those immigrating to the United States and has the most foreign-born residents of any metro area in the world (USDOHS, 2016). Large percentages of residents born outside of the United States are clustered in Queens County (48%), Kings County (38%), Bronx County (34 %), New York County (29%), and Rockland County (22%). Each of these five counties is over 1.6 standard deviations above the large MSA county mean. The New York metro area exhibits median home values, which measure land value and can indicate overall wealth, well above the large MSA county average including New York County ($828,100), Kings County ($557,100), Queens County ($450,900), Rockland County ($435,300), and Bronx County ($374,500). All are more than 1.5 standard deviations above the large MSA county mean.

New York County or the Borough of Manhattan stands apart from the other four Boroughs of New York City and the rest of the metropolitan region for its concentration of economic wealth, cultural diversity, civic and social organizations, educational and recreational opportunities, and variety of entertainment choices (PSCI is 5.5 standard deviations above the large MSA mean). Manhattan possesses one of the most talented and creative labor forces in the world. The percentage of college-educated workers in New York County is 2.7 standard deviations above large MSA county mean, and the rate

of physicians per 1,000 residents is two standard deviations above the large MSA county mean.

Like the FBS top twenty-five rankings, the influence of the political geography of Virginia is noticeable in the HCBS employment rankings. Five county equivalents, representing two MSAs, are located in the Commonwealth of Virginia. Falls Church city, possessing the highest rate of HCBS employment per 1,000 residents of large MSA counties, and Fairfax city (ranked 3rd) are part of the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA. Colonial Heights city (ranked 8th), Sussex County (ranked 17th), and Amelia County (ranked 18th) are part of the Richmond, VA MSA. The independent cities of Fairfax (ranked 1st) and Colonial Heights (ranked 5th) possess extremely high FBS employment rates per 1,000 residents, and are two of only three large MSA counties to appear in both the FBS and HCBS employment rankings.

Falls Church city has the highest rate (62.2) of HCBS employment per 1,000 residents for large MSA counties, ten standard deviations above the mean and substantially higher than Bristol County (ranked 2nd), which contains 43 HCBS workers per 1,000 residents, and Fairfax City (ranked 3rd), which employees 35 HCBS workers per 1,000 residents. The city of Falls Church is an independent municipality located seven miles west of the District of Columbia in the northeastern tip of Virginia. While Fairfax city is located entirely within Fairfax County, Falls Church city is bounded by Fairfax County to the north, west, and south, and Arlington County to the east. Like many of Virginia's independent cities in the top twenty-five rankings, Falls Church city

and Fairfax city have populations well below the large MSA county mean, approximately 12,700 and 23,000 residents respectively.

In addition to proximity, less than ten-miles, Falls Church city and Fairfax city enjoy many of the same economic advantages and quality of life amenities that metro Washington D.C. affords. Both independent cities share similar population measures, socio-economic factors, and environmental characteristics. An extremely wealthy area, Falls Church city commands substantial home prices and household incomes. The median home value is $660,900, and the median household income is $120,000; both figures are nearly four standard deviations above the large MSA county mean. The median household income is the second highest in the United States behind Loudoun County, Virginia ($122,238) and just above Fairfax County ($110,292), both located in the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA. Fairfax city is also affluent; the median home value ($456,700) and median household income ($97,242) are both more than two standard deviations above the mean for large MSA counties.

The Washington, D.C. metropolitan area is home to significant concentrations of research institutions, universities, government agencies, embassies, and supporting businesses that attract and employ a large talented labor force. This agglomeration of creativity and highly skilled workers is reflected in the educational attainment of the D.C. metro area, which contains many of the most well-educated counties in the nation. In fact, more than 74 percent of residents 25 years of age and older in Falls Church city are college educated and hold a bachelor's degree or higher; no county in the U.S. has a

larger percentage of college-educated residents. In the city of Fairfax, more than half of the population 25 and older has earned a Bachelor's Degree.

The PSCI defines a community's supply of social capital by measuring employment in religious and community-based organizations relative to the population. Metro D.C. has an active older population that often volunteer to assist with civic and community-based programs and initiatives. A product of the diverse population, a wide range of religious institutions and faiths exist in the Washington D.C. area; museums, historic landmarks, and cultural activities are abundant as well. Walkable neighborhoods and a viable public transportation network facilitate social interaction and expand access to critical goods and services while increasing social capital and promoting AIP and AIC. The PSCI index values for Falls Church city and Fairfax city are both over four standard deviations above the mean.

Geographies that possess substantial supplies of social capital and urban form that is easily navigable present optimal conditions for the creation of NORCs, communities or neighborhoods chiefly comprised of residents who have lived in their residence for a long time and aged in place. Fairfax city has a high percentage of owner-occupied homes, where the owner is 65 and older and moved in prior to 1980 (1.5 standard deviations above the large MSA county mean), a variable often used to identify NORCS and geographies prone to efficient HCBS delivery. An innovative model of HCBS provision is The Village concept, which relies on social capital, neighbors helping neighbors, to provide the support that older adults require when choosing to age in place. Lake

Barcroft Village Inc., and the Fairfax County Area Agency are promoting the village concept in the independent cities of Falls Church and Fairfax.

The HCBS employment rate in Falls Church city, 62.2 employees per 1,000 residents, is an extreme outlier resulting from sizeable employment in home health-care services and services for the elderly that are normally administered in Senior or Activity Centers. The high rate of HCBS employment per 1,000 residents stems from the low population and small geographic size of the independent city relative to the metropolitan area. The Washington D.C. metropolitan area is well served by many large health-care providers including numerous home health agencies and adult day care and senior centers. Hospitals, many of which are affiliated with medical schools, are abundant in the region and contribute to the pronounced concentration of physicians employed in the area, over seven deviations above the large MSA county mean. With a total area of approximately two square miles, Falls Church is the smallest independent city by area in Virginia; it is also the smallest county-equivalent in the United States (USCB, 2013).

Colonial Heights city (ranked 8th), Sussex County (ranked 17th), and Amelia County (ranked 18th) are part of the Richmond, VA MSA. The Richmond metropolitan area is particularly well represented in this dissertation, with three county equivalents in both the FBS and HCBS top twenty-five rankings. Like many of Virginia's independent cities and counties that are described in this study, the populations of these three counties are well below the large MSA county mean. The City of Colonial Heights is home to approximately 17,500 residents while Sussex County (12,007) and Amelia County

(12,712), the two least populated counties in the HCBS rankings, contain between twelve and thirteen thousand residents.

The HCBS employment composition varies by establishment type for the Richmond MSA top twenty-five counties. The City of Colonial Heights employees 24 HCBS workers per 1,000 residents, and although the independent city possesses a larger than average labor force for non-medical services for the elderly, HCBS employment is dominated by Home Health Care Services. The HCBS employment rates per 1,000 residents for Sussex County (14.58) and Amelia County (14.55) are a primarily a product of large concentrations of HCBS employment dedicated to administering non-medical programs and services, most commonly delivered outside the home, in Community Senior Centers. Employment in Home Health Care Services per 1,000 residents falls below the large MSA mean for both counties; in fact, Sussex County reported zero Home Health employment.

Colonial Heights city is particularly well suited for LTC provision, as proven by its standing in both the FBS and HCBS employment top twenty-five rankings. The independent city has a large proportion of residents 85 and older (3.2%, 2.7 standard deviations above the large MSA mean), the age cohort most likely to demand LTC. Another demographic statistic used to identify populations likely to require HCBS is the percentage of households comprised of a resident 65 or older and living alone. Over 15 percent of households in Colonial Heights city and 14 percent in Sussex (2.8 and 2.3 standard deviations above the large MSA mean) meet this definition, indicating a likely informal care deficit and an expected demand for establishments providing formal home-

based care. A large concentration of physicians (2.4 standard deviations above the large MSA mean) are employed Colonial Heights; these physicians, as well as other skilled medical professionals and direct care workers, facilitate efficient provision of continuum-of-care services.

The Richmond MSA is strategically located approximately 100 miles south of Washington, DC and 90 miles north of Norfolk and is serviced by three interstates, making a significant part of the U.S. population conveniently accessible by car. The Richmond MSA offers many business, personal, and lifestyle advantages including rich economic, cultural, and recreational amenities as well as access to state-of the-art medical care. These advantages, coupled with the extremely low populations of the Richmond MSA top twenty-five counties, influence the high HCBS employment rates per 1,000 residents in the Richmond metro area. Two AAAs serve the Richmond MSA and are committed to providing the goods and services necessary for older adults to age in a place of their choosing. The Crater District Area Agency on Aging provides services to the city of Colonial Heights and Sussex County while the Piedmont Senior Resources Area Agency on Aging, Inc., administers direct-care services, in-home services, and nutrition services to the older adults living in Amelia County.

Ramsey County (ranked 9th), Hennepin County (ranked 10th), and Dakota County (ranked 12th) are part of the Minneapolis-St. Paul-Bloomington, MN-WI MSA, which is well served by continuum-of care-establishments that provide both facility and home-based services. The HCBS employment rate per 1,000 residents in Ramsey County (23.9) and Hennepin County (20.4) are more than one standard deviation above the mean

for both HCBS NAICS designations but are predominantly derived from employment in home health-care services (NAICS 62161). Ramsey County (515,732) and Hennepin County (1,170,623) possess populations that are far above the large MSA mean (393,534) and are designated as large central metro counties by the NCHS Urban-Rural Classification Scheme. Dakota County has a population of 402,306 and a HCBS employment rate of 18 workers per 1,000 residents, which is chiefly comprised of employment in services for the elderly and those with disabilities (NAICS 62412).

Several large LTC firms, which operate in multiple states, are headquartered in the Twin Cities metropolitan area (Ziegler, 2015). Ecumen and Presbyterian Homes and Services maintain their home offices in Ramsey County and oversee a diverse range of senior housing options along the continuum of care as well as provide HCBS to older adults wishing to remain in their homes. While both establishments provide their services across multiple states, Ecumen also provides clinical consulting and management services to other LTC providers. Augustana Care and Elim Care, headquartered in Hennepin County, operate senior housing communities and administer continuum-of-care services in multiple states. Augustana Care and Elim Care provide extensive HCBS and adult day care programs; the day programs provide opportunities for socializing and curb the negative effects of isolation.

Episcopal Homes, a large LTC employer in Ramsey County, provides an array of continuum-of-care services including HCBS and FBS alternatives for residents in the Saint Paul area. In-home services are provided to residents living in Assisted Living and Independent Living communities as well as to older adults wising to remain at home.

The Gardens, operated by Episcopal Homes, is Minnesota's first nursing home to employ the Green House Model, an innovate method of FBS provided in a home-like setting. A large HCBS employer in Dakota County is the Regina Medical Center in Hastings, which provides a broad array of continuum-of-care services. A variety of adult day services complement an acute care hospital and memory care community.

HCBS establishments with large workforces in Hennepin County include Health Dimensions Group and the Martin Luther Campus. Health Dimensions Group is a large LTC provider headquartered in Minneapolis that provides management and consulting services to HCBS across the country. The Martin Luther Campus in Bloomington, part of the Ebenezer family of Senior Care communities, provides many HCBS services including Adult Day Clubs. These clubs provide programs and activities catered towards older adults as well as a place for daily socializing, particularly important due to the negative health effects that stem from isolation. Mill City Commons, in the Central Riverfront District of Minneapolis (Hennepin County), is part of the Village to Village Network and provides HCBS to its members. The village organization is an innovative method of providing goods and services that address the specific needs of individual residents in the neighborhood.

The metropolitan area centered around the Twin Cities of Minneapolis (Hennepin County) and Saint Paul (Ramsey County) is well served by LTC establishments and successful public policy initiatives that afford its residents an opportunity to AIP. The Twin Cities MSA is home to a diverse well-educated population. Over 39 percent of residents in Ramsey County and 46 percent in Hennepin County over 25 years old hold a

bachelor's degree (1 and 1.5 standard deviations above the large MSA mean). A substantial health-care and LTC apparatus, spearheaded by large concentrations of physicians, over a standard deviation above the large MSA county mean in Ramsey and Hennepin counties, deliver continuum-of-care services dedicated to both FBS and HCBS. The Twin Cities contain many volunteer, education, religious and civic organizations that foster social capital; the PSCI in Ramsey County is1.3 standard deviations above the large MSA county mean. The Twin Cities metropolitan area is well served by organizations and programs aimed at improving the lives of older residents and their opportunity to AIP.

The Metropolitan Area Agency on Aging (MAAA) is the designated regional Area Agency on Aging for seven counties centered around the Twin Cities including Ramsey County, Hennepin County, and Dakota County. The MAAA often collaborates with other governmental agencies, non-profit advocates, and private establishments that provide services to the aging population. The Metro ElderCare Development Partnership is a prime of example of a successful collaborative initiative. Multiple organizations including the Metropolitan Area Agency on Aging; Minnesota Home Care Association; Aging Services Minnesota; Care Providers; and the Counties of Carver, Dakota, Hennepin, and Ramsey work to bring consumers and providers of senior services together and identify barriers to efficient provision of these services.

Dedicated to fostering the efficient provision of HCBS, The Living At Home Network provides a mechanism to coordinate and cultivate positive relationships between volunteers, health professionals, and all other available community resources that give

older adults the opportunity to remain in their homes and communities. The Communities for a Lifetime initiative is a similar program that is designed to cultivate relationships between residents, local businesses, community advocates, and local government. This initiative emphasizes the importance of transportation and accessibility for older residents of a community. Pedestrian networks, comprised of sidewalks and greenway trails, are an important means of transportation as well as an opportunity for older residents to exercise. Additional priorities of this initiative include affordable housing and access to a full range of continuum-of-care services.

Minnesota has made aging policy a priority and implemented statewide programs which benefit the residents of the Twin Cities MSA. Aging 2030 is a project meant to prepare Minnesota for impending demographic change and the aging of the population. The cooperative effort between the Department of Human Services, the Minnesota Board on Aging, the Department of Health, and other state agencies is working to identify the significant impacts of a rapidly aging population. Information gleaned from this extensive effort is being used to create a comprehensive plan to guide policy and develop infrastructure necessary to adequately serve the state's changing population.

The state's efforts to assist local communities in becoming age friendly, more specifically dementia friendly, was acknowledged in 2015 with an Aging Innovations Award from the National Association of Area Agencies on Aging. The Minnesota Association of Area Agencies on Aging partnered with the Alzheimer's Association to provide technical assistance and support to local communities by identifying and addressing specific community goals. Basic components of age-friendly communities

include flexible housing options, affordable transportation options, access to goods and services, and opportunities for community engagement. St. Paul provides an example of where this initiative had been implemented successfully, where community leaders and volunteers were trained by experts to lead more localized sessions in specific neighborhoods.

Bristol County, Rhode Island (ranked 2nd) contains 43 HCBS workers per 1,000 residents and holds above average employment per 1,000 residents in both NAICS designated HCBS establishment types. However, the workforce primarily engaged in administering non-medical home-based care in Adult Day Centers or Senior Activity Center settings is the catalyst for Bristol County's top twenty-five HCBS ranking. The number of employees per 1,000 residents in NAICS 62412 establishments (35.4) in Bristol County is the highest of all large MSA counties. Bristol County, Rhode Island, has a population of 49,426, far the below the large MSA county mean and is the least populated county in the large MSA HCBS rankings outside of the Commonwealth of Virginia. The lone representative of the Providence-Warwick, RI-MA MSA in this dissertation, Bristol County is one of three large MSA counties to appear in both the FBS and HCBS top twenty-five rankings.

Specific demographic and socio-economic factors in Bristol County promote large rates of LTC employment per 1,000 residents. A large population of older adults 85 and older (2.5 standard deviations above the large MSA county mean) coupled with a high percentage of owner occupied homes, where the owner is 65 or older and moved into the home prior to 1980, are associated with LTC demand (1.7 standard deviations

above the large MSA county mean). High concentrations of older adults that develop naturally because residents have remained in their homes as they aged are often conducive to HCBS provision. A large rate of physicians per 1,000 residents (3.2 standard deviations above the large MSA county mean) and employees in institutions of higher education (2.9 standard deviations above the large MSA county mean) are instrumental in facilitating the supply of a broad array of continuum-of-care service.

Norfolk County, Massachusetts (ranked 5th) and Essex County, Massachusetts (ranked 11th) are part of the Boston-Cambridge-Newton, MA-NH MSA. Norfolk County, population 677,296, has a HCBS employment rate just over 30 workers per 1,000 residents (30.1), overwhelmingly predicated on non-medical home-based care of elderly (NAICS 62412). Essex County contains approximately 750,000 residents and a HCBS employment rate of 20.1 workers per 1,000 residents. HCBS employment in Norfolk County is well-balanced; employment rates for both HCBS NAICS components are over one standard deviation above the large MSA county mean.

Norfolk County is an affluent part of the Boston metro area with a median home value ($391,100) and median income ($84,916) over 1.5 standard deviations above the large MSA county mean. Home to many of the nation's top universities and hospitals, Norfolk County is particularly well educated: 49 percent of the population 25 and older hold a bachelor's degree, and there is a large concentration of physicians (over 2 standard deviations above the large MSA county mean). A large percentage of homes in Norfolk County are occupied by an owner who is 65 or older and moved into the home prior to 1980, often signifying the presence of NORCS (1.7 standard deviations above the large

MSA county mean). Housing, socio-economic, and demographic characteristics in the Boston metro area are conducive for the village method of HCBS provision. Wellesley Neighbors in Norfolk County and Greater Newburyport Village in Essex County are members of the Village to Village Network.

The Boston metro area contains many large HCBS establishments (Ziegler, 2015). For example, Hebrew Senior Life and White Oak Cottages at Fox Hill Village, both located in Norfolk County, provide dementia care in a greenhouse setting. Home Health Foundation Inc., in Essex County is comprised of three not-for-profit affiliate agencies: Home Health VNA, Merrimack Valley Hospice, and Home Care, Inc., and provides continuum-of-care services in the home and community.

Saint Louis city (ranked 19th) and Saint Louis County (ranked 24th) are part of the St. Louis, MO-IL MSA. Saint Louis city (14.5) and Saint Louis County (12.6) possess similar HCBS employment per 1,000 residents and contain a relative balance of both HCBS NAICS designations. The City of Saint Louis contains a population of approximately 320,000 and is designated as a large central county equivalent by the NCHS classification system. The independent city is bounded entirely by the western bank of the Mississippi River and Saint Louis County, which is populated by approximately one million residents.

Saint Louis city has a diverse economic and demographic composition. Median household incomes are well below the large MSA county average (over 1.6 standard deviations below the large MSA mean). The City of Saint Louis is home to many universities and colleges and contains a high concentration of employment in higher

education: the rate of employment in higher education per 1,000 residents is over 10 standard deviations above the large MSA county mean. Additionally, the City of Saint Louis has a large population 65 or older who have resided in their current homes since 1980 (1.6 standard deviations above the large MSA mean), an indicator of geographies where residents are particularly keen to remain active in their community and AIP. These neighborhoods often present significant opportunity for efficient HCBS provision.

Saint Louis County is generally more affluent than the central city: the percent of the population with a bachelor's degree, median income, and median age are over a standard deviation higher than the independent city of Saint Louis. A significant portion of Saint Louis County's population is 85 and older and well served by a large concentration of physicians (both 1.5 standard deviations above the large MSA county mean). Saint Louis County contains a large concentration of continuum-of-care establishments, including Lutheran Senior Services, that offer a full array of home and community-based services designed to meet the specific needs of seniors. Easterseals Midwest's Community Living, a large HCBS provider in Saint Louis County, works to allow its clients to live independently in homes of their own and participate in the community.

The 2013 National Center for Health Statistics' (NCHS) Urban–Rural Classification Scheme for Counties defines 52 large MSAs as having a total population of over one million residents. Large MSAs contain 436 counties, of which 68 are further designated as Central Counties and the remaining 368 as Fringe Counties. The scheme is designed to analyze health disparities within large metropolitan areas; large central

counties generally reflect inner cities, and fringe counties represent the suburbs. Data shows that residents of large fringe metro counties significantly outperform residents of other urbanization levels on most health measures. It is important to differentiate between urbanization levels within metropolitan areas because variations in urban form can produce population and housing densities in large central counties that are upwards of ten times as high as those in large fringe counties (Ingram and Franco, 2014).

The more densely inhabited large central counties are far more prominent in the HCBS top twenty-five. While only two large central MSA counties hold a position in the FBS top twenty-five rankings, twelve large central MSA counties are found in the HCBS top twenty-five, eight of which have populations over one million residents. Two large MSAs contain multiple central counties in the HCBS top twenty-five: the New York-Newark-Jersey City, NY-NJ-PA MSA contains four large central counties, and the Minneapolis-St. Paul-Bloomington, MN-WI MSA contains two large central counties. The following five large central counties have not been addressed to this point in the HCBS analysis: Milwaukee County, Wisconsin (ranked 15th), Franklin County, Ohio (ranked 16th), Denver County, Colorado (ranked 20th), Bexar County, Texas (ranked 21st), and Cuyahoga County, Ohio (ranked 25th).

The FBS and HCBS top twenty-five rankings for large MSA counties are geographically distributed among 23 MSAs and include 47 counties. Fairfax city, Virginia; Colonial Heights city, Virginia; and Bristol County, Rhode Island are the only counties present in the top twenty-five for both facility-based and home-based LTC establishments. Nine MSAs are represented in both top twenty-five ranking, but only

two (Richmond, VA MSA and Minneapolis-St. Paul-Bloomington, MN-WI MSA) hold multiple counties in each top twenty-five. The Richmond, VA MSA holds three counties in both rankings; the Minneapolis-St. Paul-Bloomington, MN-WI MSA contains two FBS and three HCBS top twenty-five counties.

The New York-Newark-Jersey City, NY-NJ-PA MSA contains five HCBS top twenty-five counties, the most of any MSA for a specific type of LTC establishment. This fact reinforces the premise that population density and higher population are far more influential in HCBS than FBS employment. The Commonwealth of Virginia enjoys remarkable representation in this investigation. Ten counties within three MSAs possess LTC employment rates that are included in one of the two LTC top twenty-five rankings. The uniqueness of Virginia's political geography is particularly evident with the presence of eight independent cities as county equivalents.

Notable geographical considerations regarding the large MSA county top twenty-five rankings include a lack of western counties. Counties in California and Arizona, considered ideal retirement locations, do not produce large FBS or HCBS employment rates per 1,000 residents. Western counties do, however, rank high in terms of absolute FBS and HCBS employment. Los Angeles County contains the top FBS total employment (59,215) for large MSA counties. Maricopa County, Arizona (3rd), San Diego County, California (4th), and Orange County, California (6th) express large values for total FBS employment, ranking in the top ten for large MSA counties. The top west coast counties for absolute HCBS employment are Los Angeles County (ranked 5th) and Maricopa County (ranked 18th).

The low rates of FBS and HCBS employment per 1,000 residents for western counties likely result from their size. Western counties, created much later than the small administrative units of the east coast, are much larger. The geographical size of western counties like Los Angeles County, roughly 175 times the size of New York County, mitigates the large overall employment numbers when normalized by the population. In fact, the New York metro area is distinct because it has multiple counties that rank high in both absolute LTC employment and LTC employment per 1,000 residents.

The specific NAICS subcomponents of the FBS and HCBS employment in large MSA counties are provided in **Table (4.3)**.

Table 4.3. FBS and HCBS Employment by NAICS Code, Large MSA.

Large Metro Counties	# Employees	% AIP
All AIP	2,576,459	100%
All FBS	1,279,930	50%
NAICS 62311	835,799	32%
NAICS 62331	444131	17%
All HCBS	1,296,529	50%
NAICS 62161	799,073	31%
NAICS 62412	497,456	19%

n=436 **(ACS, 2013)**

4.2.3 Facility-Based Services, Small and Medium MSA Counties

The remaining 731 MSA counties have FBS employment rates per 1,000 residents similar to the large MSA counties. The small and medium MSA counties average 9.15 FBS workers per 1,000 residents, a slightly higher FBS employment rate than was found in large MSA counties (7.75). The largest FBS employment rate per 1,000 residents

among small and medium MSA counties is 39.48 (Armstrong County, Texas) while the top FBS employment rate per 1,000 residents in large MSA counties is 40 (Fairfax city, Virginia), an almost identical employment rate. The lowest reported FBS employment rate per 1,000 residents in small and medium MSA counties is in Effingham County, Georgia (0.378); 325 counties exceed the mean while thirty counties reported zero FBS employment.

The Facility-Based Services employment rate is a composite of total employment in Nursing Care Facilities and Residential Care Facilities per 1,000 county residents. Rankings for small and medium MSA counties **(Table 4.4)** describe the NAICS composition of the top twenty-five counties and show that employment in both types of FBS establishments is not uniformly distributed. Two counties among the top twenty-five fall below the small and medium MSA mean for total workers employed in Nursing Care Facilities per 1,000 residents. Bedford city (ranked 2nd) and Butte County (ranked 25th) are more than one standard deviation below the employment rate mean for Nursing Care Facilities per 1,000 residents and report zero workers.

Ten top twenty-five counties fall below the small and medium MSA mean for employment in Residential Care Facilities. Fillmore County, Morton County, Doniphan County, and Henry County express employment in Residential Care Facilities per 1,000 residents that is below the small and medium MSA mean. Furthermore, Mills County (ranked 3rd), Ford County (ranked 5th), McCook County (ranked 6th), Crockett County (ranked 13th), Wabaunsee County (ranked 15th), and Kingman County (ranked 19th) possess employment in Residential Care Facilities per 1,000 residents that is under the

small and medium MSA county mean and have zero workers employed in NAICS 62331 establishments. There are six counties in the top twenty-five that display FBS employment rates per 1,000 residents over one standard deviation above the mean for both FBS NAICS designation employment types including Guthrie County (ranked 8th), Montour County (ranked 9th), Wells County (ranked 11th), Staunton city (ranked 14th), Lynchburg city (ranked 21st), and Salem city (ranked 23rd).

Armstrong County has the highest rate of (39.5) of FBS employment per 1,000 residents for small and medium MSA counties: 5.6 standard deviations above the mean. With a population of 1,773, far below the small and medium MSA county mean of approximately 128,000, Armstrong County claims the fourth lowest population of all MSA counties. Armstrong County, located in the Texas Panhandle, is part of the Amarillo, Texas MSA. The landscape and economy are largely dominated by prairies and ranching activities (Abbe, 2010). The small population contains a high percentage of residents 85 and older, more than a standard deviation above the mean for small and medium MSA counties. A pronounced aging population coupled with a low Informal Caregiver Support Ratio,1.4 standard deviations below the small and medium MSA county mean, accentuate a need for continuum-of-care products and services. The Area Agency on Aging of the Panhandle serves Armstrong County as an advocate for the Panhandle's elderly population.

Table 4.4. Small and Medium Metropolitan Counties (MSAs <1 Million) Ranked by Total Employment in Facility-Based Services per 1,000 Residents (n=731).

Rank	Small / Medium Metropolitan County	F B S: EMP / 1K POP	F B S: Total EMP	62311 / 1K POP	EMP 62311	62331 / 1K POP	EMP 62331	Population Thousands
1	Armstrong County, Texas	39.481	70	33.841	60	5.640	10	1.773
2	Bedford city, Virginia	32.716	198	0.000	0	32.716	198	6.052
3	Mills County, Iowa	30.902	463	30.902	463	0.000	0	14.983
4	Benton County, Minnesota	30.782	1193	26.267	1018	4.515	175	38.756
5	Ford County, Illinois	30.234	423	30.234	423	0.000	0	13.991
6	McCook County, South Dakota	29.795	167	29.795	167	0.000	0	5.605
7	Harvey County, Kansas	29.203	1014	8.784	305	20.419	709	34.722
8	Guthrie County, Iowa	28.959	314	16.139	175	12.819	139	10.843
9	Montour County, Pennsylvania	28.674	527	20.404	375	8.270	152	18.379
10	Brooks County, Georgia	27.384	435	23.607	375	3.777	60	15.885
11	Wells County, Indiana	27.069	750	13.534	375	13.534	375	27.707
12	Fillmore County, Minnesota	26.929	562	26.449	552	0.479	10	20.870
13	Crockett County, Tennessee	25.727	375	25.727	375	0.000	0	14.576
14	Staunton city, Virginia	25.470	611	15.632	375	9.838	236	23.989
15	Wabaunsee County, Kansas	24.823	175	24.823	175	0.000	0	7.050
16	Morton County, North Dakota	24.073	671	23.714	661	0.359	10	27.874
17	Doniphan County, Kansas	23.403	185	22.138	175	1.265	10	7.905
18	Harrisonburg city, Virginia	22.533	1125	7.511	375	15.022	750	49.926
19	Kingman County, Kansas	22.265	175	22.265	175	0.000	0	7.860
20	Henry County, Alabama	22.244	385	21.666	375	0.578	10	17.308
21	Lynchburg city, Virginia	22.153	1694	13.195	1009	8.958	685	76.467
22	Woodford County, Illinois	22.132	861	17.634	686	4.498	175	38.903
23	Salem city, Virginia	22.044	550	15.030	375	7.014	175	24.950
24	Seward County, Nebraska	21.576	363	18.010	303	3.566	60	16.824
25	Butte County, Idaho	21.536	60	0.000	0	21.536	60	2.786
	Average	**9.150**	**1117**	**6.465**	**718.3**	**2.685**	**398.3**	**128.187**
	Standard Deviation	**5.369**	**1418**	**4.663**	**920**	**2.974**	**621.2**	**151.698**

Yellow Highlight >= 1 standard deviation above Small and Medium Metropolitan mean. **Blue Highlight** < 1 standard deviation below the Small and Medium Metropolitan mean. FBS: Facility-Based Services, 62311: NAICS Code for Nursing Care Facilities, 62331: NAICS Code for Residential Care Facilities. Source ACS 2009-2013.

Although there are some highly competitive regional and local Health Services clusters, most Heath Care Services are scaled to address the needs of a specific market or population and are proportional to that local population of the region (Delgado, et al., 2014). Health Services, as well as Long-Term Care providers are normally found in all geographies and employment levels. Interestingly, population data reveals that none of the small and medium counties in the FBS employment top twenty-five rankings are above the population mean of approximately 128,000. The most populated county equivalent is Lynchburg city (76,500, ranked 21st), followed by Harrisonburg city (50,000, ranked 18th). Like the FBS rankings for large MSA counties, Virginia is the most represented state; five independent cities are among the small and medium MSA county top twenty-five, highlighting the influence of Virginia's unique City/County political system.

Small and medium MSAs are less populated and contain fewer counties than their large MSA counterparts. The average large MSA contains 8.3 counties while small and medium MSAs include approximately 2.2 counties. As such, the small and medium FBS top twenty-five rankings are dispersed over 23 metro areas, five more than were found in the large MSA top twenty-five. The Lynchburg, VA and Wichita, KS MSAs, are the only metro areas with more than one county in the rankings; each contain two top twenty-five counties.

Bedford city (ranked 2nd) and Lynchburg city (ranked 21st) are located within the Lynchburg, VA MSA, situated just south of the Blue Ridge Mountains, in central Virginia. The Central Virginia Alliance for Community Living operates as the local

designated Area Agency on Aging for Bedford city and Lynchburg city. FBS employment in Bedford city per 1,000 residents (32.7) is 4.4 standard deviations above the small and medium MSA county mean. The NAICS composition of FBS employment in Bedford city is particularly noteworthy because the independent city reported zero firms or workers in Skilled Nursing Facilities; its place in the FBS rankings comes solely from employment in Residential Care Facilities. English Meadows Elks Home (formerly The Elks National Home) is a multi-building assisted and independent living facility located on 100 acres within Bedford city and was listed on the National Register of Historic Places in 2008.

The population of Bedford city (6,052) is well below the small and medium MSA county mean with a particularly high concentration of residents 85 and older, 4 standard deviations above the small and medium MSA county mean. Bedford city contains a high percentage of households comprised of a resident 65 or older living alone (17 percent), 2.5 standard deviations above the small and medium MSA county mean. Older adults who live alone are potentially vulnerable and may increase demand for continuum-of-care products and services (Rubinstein, Lubbe and Mintzer, 1994). A high Social Capital Index value (2.7 standard deviations above the small and medium MSA county mean) illustrates a significant presence of community-based organizations.

Lynchburg city, the most populated county equivalent (76,500) in the FBS small and medium MSA county top twenty-five rankings, contains a considerably younger population (3 standard deviations) and a much larger proportion of employment in higher education institutions (3 standard deviations) than Bedford city. The difference is largely

influenced by the presence of several colleges and universities, the largest being Liberty University. Liberty University is among the largest private four-year nonprofit universities in the United States, and it is the world's largest Christian university due to its online enrollment. Resident enrollment for the spring 2012 semester was almost 12,000. In April 2012, Liberty University Online reached an enrollment of 75,000 (Lynchburg CAFR, 2013). Lynchburg city is one of six small and medium MSA counties to hold a FBS employment rate per 1,000 residents over one standard deviation above the mean for both Skilled Nursing and Residential Care Facilities. Centra Health, Lynchburg's largest employer, is a regional nonprofit healthcare system that provides a myriad of services including long-term care in facility and home settings. It was created in 1987 through the merger of the Lynchburg General and Virginia Baptist hospitals. Centra employs 175 physicians, specialists, and surgeons who work in the Lynchburg metro area (Centra Health, 2017).

Staunton city (ranked 14th), Harrisonburg city (ranked 18th), and Salem city (ranked 23rd) are independent cities, located in the Commonwealth of Virginia; each employ more than the small and medium MSA county mean in both Nursing Care and Residential Care Facilities. The Valley Program for Aging Services, Inc., serves the cities of Staunton and Harrisburg; the Local Area Agency on Aging, Inc., is charged with assisting the needs and coordinating services for older adults in Salem. Staunton and Salem are similar in population, just under 25,000 residents in each city, and both possess a vibrant identity founded on rich social, cultural, and recreational amenities. Staunton and Salem both include downtowns consisting of colleges, museums, theaters, and

libraries. Staunton is the birthplace of Woodrow Wilson and the first presidential library in Virginia (Staunton, 2017). With these amenities and amazing parks and natural recreation areas, residents, students, and tourists intermingle and create positive social capital. Both cities possess PSCI values over 2 standard deviations above the small and medium MSA county mean.

Harrisonburg city, the second most populated county equivalent (49,926) in the FBS small and medium MSA county top twenty-five rankings, is located in the scenic Shenandoah Valley region of Virginia. The mountain landscape provides an abundance of outdoor recreation opportunities while downtown Harrisonburg is known for its arts, culture, and historic past. There are four colleges and universities, with a total enrollment of approximately 32,200, in Harrisonburg. James Madison University, located in middle of the city, is the largest institution of higher learning with approximately 22,500 students (Harrisonburg CAFR, 2015). With a pronounced education, arts, and recreation employment cluster, Harrisonburg has a diverse, young, well-educated population. The percent of residents with a college degree and the percent that are foreign born are both 1.5 standard deviations above the small and medium MSA county mean. Additionally, the city has become a popular retirement destination that is well served with medical and healthcare services; the rate of physicians per 1,000 residents is 1.8 standard deviations above the small and medium MSA county mean.

Mills County (ranked 3rd), Benton County (ranked 4th), Ford County (ranked 5th), and McCook County (ranked 6th) have approximately 30 FBS workers per 1,000 residents. FBS employment in Mills County, Ford County, and McCook County are

based solely on employment in Nursing Homes; both counties report zero workers in Residential Care Facilities. Likewise, the FBS labor force in Benton County, Minnesota is mainly employed by Skilled Nursing Facilities although the workforce dedicated to Residential Care Facilities is above the small and medium MSA county mean. Ford County and McCook County contain large percentages of residents 85 and older, 2.7 and 1.8 standard deviations above the small and medium MSA mean respectively. Additionally, Ford County has a large concentration of residents who are 65 or older and living alone (1.9 standard deviations above the small and medium MSA mean); both demographic trends are linked to increased LTC demand (Bernard, 2004).

Guthrie County (ranked 8th), Mountour County (ranked 9th), and Wells County (ranked 11th) are over one standard deviation above the small and medium MSA county mean for both types of FBS establishments. These counties are also similar demographically, each containing significant percentages of residents 85 and older (1.2, 2.1, and 1.6 standard deviations above the small and medium MSA mean). FBS employment in Fillmore County, Minnesota (ranked 12th) is found almost entirely in Nursing Care Facilities, and its proportion of residents 85 and older is nearly three standard deviations above the small and medium MSA county mean.

4.2.4 Home and Community Based-Services, Small and Medium MSA Counties

Home and Community-Based Services are distributed among small and medium metropolitan counties at an average of 5.78 workers per 1,000 residents, compared to 5.41 workers in large metro counties. The highest small and medium MSA county HCBS employment rate is 112.1 workers per 1,000 residents and is found in Hampshire County,

Massachusetts. This rate is considerably higher than the top HCBS employment rate per 1,000 residents (62.21, Falls Church city) recorded in large MSA counties. Custer County, South Dakota, contains the fewest HCBS workers per 1,000 residents (0.241) of the 688 counties to report HCBS employment. There are 264 small and medium metro counties above the mean for HCBS employment per 1,000 residents and 43 counties reporting zero workers in HCBS.

The top twenty-five HCBS employment rates per 1,000 residents for small and medium MSA counties are presented in **Table 4.5**. Proportions of the HCBS workforce dedicated to providing Home Health Care Services and those employed in Services for the Elderly and Persons with Disabilities vary noticeably within the rankings. Two counties in the top twenty-five fall below the small and medium MSA mean for employees in Home Health Care Services per 1,000 residents: Hampshire County and Osage County. Three of the top twenty-five counties rank below the mean for workers dedicated to providing Services for the Elderly and Persons with Disabilities per 1,000 residents including Irion County, Smith County, and Taylor County, with Irion County (ranked 5th) reporting zero workers.

Table 4.5. Small and Medium Metropolitan Counties (MSAs <1 Million) Ranked by Total Employment in Home and Community-Based Services per 1,000 Residents (n=731).

Rank	Small / Medium Metropolitan County	HCBS: Emp / 1K POP	HCBS: Total Emp	62161 / 1K POP	EMP 62161	62412 / 1K POP	EMP 62412	Population Thousands
1	Hampshire County, Massachusetts	112.089	17852	2.21	352	109.878	17500	159.267
2	Osage County, Kansas	108.241	1760	0.615	10	107.626	1750	16.26
3	Cameron County, Texas	39.741	16322	19.756	8114	19.985	8208	410.71
4	Lackawanna County, Pennsylvania	38.871	8329	3.869	829	35.002	7500	214.275
5	Irion County, Texas	37.43	60	37.43	60	0	0	1.603
6	Benton County, Minnesota	37.181	1441	4.515	175	32.666	1266	38.756
7	Hidalgo County, Texas	36.006	28468	21.838	17266	14.168	11202	790.646
8	Black Hawk County, Iowa	31.589	4153	3.065	403	28.524	3750	131.468
9	Cape Girardeau County, Missouri	30.358	2317	12.657	966	17.701	1351	76.322
10	Webb County, Texas	25.927	6607	13.009	3315	12.918	3292	254.829
11	Clay County, West Virginia	25.128	235	6.416	60	18.713	175	9.352
12	Pottawatomie County, Kansas	22.991	506	5.952	131	17.038	375	22.009
13	Grayson County, Texas	22.203	2693	19.111	2318	3.092	375	121.292
14	Sequoyah County, Oklahoma	22.111	925	4.183	175	17.928	750	41.834
15	Sangamon County, Illinois	21.925	4347	3.011	597	18.914	3750	198.269
16	Smith County, Texas	20.775	4409	18.815	3993	1.96	416	212.227
17	Nueces County, Texas	20.685	7121	17.141	5901	3.544	1220	344.257
18	Ouachita Parish, Louisiana	20.538	3176	11.937	1846	8.601	1330	154.641
19	Taylor County, Texas	19.64	2604	16.811	2229	2.828	375	132.588
20	Allen County, Ohio	18.084	1915	14.08	1491	4.004	424	105.895
21	Madison County, Tennessee	17.83	1752	5.2	511	12.63	1241	98.261
22	Lafayette Parish, Louisiana	17.698	3977	7.267	1633	10.431	2344	224.719
23	Doña Ana County, New Mexico	17.213	3635	7.203	1521	10.011	2114	211.175
24	Williamson County, Illinois	16.965	1130	13.347	889	3.618	241	66.606
25	Tangipahoa Parish, Louisiana	16.623	2039	5.739	704	10.883	1335	122.665
	Average	**5.779**	**917.083**	**2.791**	**472.8**	**2.988**	**444.3**	**128.187**
	Standard Deviation	**7.569**	**1838.561**	**3.23**	**997.6**	**6.547**	**1056**	**151.698**

Yellow Highlight >= 1 standard deviation above Small and Medium Metropolitan mean. HCBS: Home and Community-Based Services, 62161: NAICS Code for Home Health Care Services, 62412: NAICS Code for Services for Elderly & Disabilities. Source ACS 2009-2013.

There are seven counties in the top twenty-five that display HCBS employment rates per 1,000 residents that are over one standard deviation above the mean for both types of HCBS NAICS codes including Cameron County (ranked 3rd), Hidalgo County (ranked 7th), Cape Girardeau County (ranked 9th), Webb County (ranked 10th), Clay County (ranked 11th), Lafayette Parish (ranked 22nd), and Doña Ana County (ranked 23rd). Like the top twenty-five rankings describing large MSA counties, the small and medium MSA counties show that the HCBS rankings include more populated counties than found in the FBS rankings. While the small and medium MSA county FBS top twenty-five did not include any counties above the population mean of approximately 128,000, the HCBS top twenty-five rankings include 14 counties with populations above the mean. The small and medium HCBS top twenty-five rankings are dispersed among 25 metro areas, 11 more than were found in the large MSA top twenty-five. There are significantly more small and medium MSAs (329) than large MSAs (52); and on average they contain fewer counties, ultimately leading to less geographically concentrated employment for both HCBS and FBS.

Hampshire County (ranked 1st) and Osage County (ranked 2nd) possess HCBS employment rates per 1,000 residents that are noticeably higher than the remaining top twenty-five counties while employment in Home Health Care Services falls below the small and medium MSA county mean. Both Hampshire and Osage County are over 13.5 standard deviations above the small and medium MSA mean. Hampshire County in the Springfield, MA MSA contains many Senior Centers. The Massachusetts Association of Councils On Aging & Senior Center Directors was created in 1979 to encourage and

promote the development of new Senior Centers in the Commonwealth; a key objective is to bring older adults access to technology and to empower them to share their knowledge and life experience with younger generations.

Nursing homes are a major economic contributor both statewide and in local communities across the Commonwealth. In many rural communities, nursing homes are the largest healthcare employer in the region. The Massachusetts Senior Care Association represents a diverse set of organizations that include nursing and rehabilitation facilities, assisted living residences, residential care facilities, and continuing-care retirement communities. Employing a staff of over 50,000, Mass Senior Care is a significant part of the Massachusetts economy.

Seven additional counties are over three standard deviations above the HCBS mean for small and medium MSA counties: Osage County (ranked 2nd) employs 108 HCBS workers per 1,000 residents, who are almost entirely tasked with providing non-medical home-based care for the elderly (NAICS 62412). Cameron County (ranked 3rd) has a HCBS employment rate of 39.7 workers per 1,000 residents, well below Hampshire County (112) and Osage County (108). Cameron County is served by The Area Agency on Aging of the Lower Rio Grande Valley. The Area Agency on Aging of Concho Valley serves Irion County (ranked 5th). Six additional Texas counties are in the HCBS top twenty-five for small and medium MSA counties; the eight Texas counties are the most provided by a State for any of the four top twenty-five MSA county rankings included in this dissertation.

The specific NAICS subcomponents of the FBS and HCBS employment in small and medium MSA counties are provided in **Table 4.6**. The distribution of FBS and HCBS employment per 1,000 residents is less concentrated within the 329 small and medium MSAs that have populations fewer than one million residents. The top twenty-five rankings for small and medium MSA counties are geographically spread among 45 MSAs and include 49 counties. Benton County, located in the St. Cloud, MN MSA, is the only county present in the top twenty-five of both types of LTC establishments. An additional four MSAs have two counties represented in the rankings; the Topeka, KS and Jackson, TN MSAs hold one county in both top twenty-five rankings, and the Lynchburg, VA and Wichita, KS MSAs each contain a pair of counties in the FBS employment rankings. Similar to the HCBS top twenty-five rankings for small and medium MSA counties, the FBS rankings are sparsely represented by counties in the western United States.

Table 4.6. FBS and HCBS Employment by NAICS Code, Small and Medium MSA.

Small/Medium Metro Counties	# Employees	% AIP
All AIP	1,486,638	100%
All FBS	816,250	55%
NAICS 62311	525,107	35%
NAICS 62331	291143	20%
All HCBS	670,388	45%
NAICS 62161	345,618	23%
NAICS 62412	324,770	22%

n=731 **(ACS, 2013)**

4.3 Regression Analysis

The purpose of this regression analysis is to identify and explain the practical relationship between employment in Facility-Based Services and Home and Community-Based Services per 1,000 county residents and specific independent variables. The Stepwise Regression Analysis will consist of four regression models: two models are designed to investigate FBS, and two will describe HCBS. Counties within MSAs of over one million residents are investigated independently from the remaining MSA counties. A stepwise regression analysis is designed to produce a model that finds the most parsimonious set of predictors that are effective in predicting the dependent variable. SPSS version 24 was used to perform the stepwise regression analysis and identify the model that maximized the R-Square of the included variables.

It is important to explore and comprehend the relationship between the independent and dependent variables before performing a regression analysis. A common indicator used to gauge the association between the independent and dependent variables is the correlation coefficient, which measures the strength and direction of a linear relationship between two variables. A correlation coefficient close to one describes a strong positive linear relationship; a correlation coefficient approaching negative one illustrates a strong negative linear association between the variables. **Table 4.7** describes the Pearson Correlation Coefficients between the dependent and predictor Variables.

Table 4.7. Pearson Correlation Coefficients of Potential Predictor Variables.

Independent Variable Name	Facility - Based Large Metro > 1 Million	Home & Community Based Large Metro > 1 Million	Facility - Based Other Metro < 1 Million	Home & Community Based Other Metro < 1 Million
Population Measures				
% Population Change From 2000 to 2013	-0.283**	-0.20**	-0.231**	-0.045
% of Population 85 and Older	0.497**	0.260**	0.538**	0.07
% of Baby Boomers (Population 50-69 Years Old)	0.097*	-0.08	0.095*	-0.083*
% of Population 65 and Older with a Disability	-0.082	-.105*	-.171**	0.025
% of Population 65 and Older with Cognitive Disability	-0.177**	-0.029	-0.215**	0.014
Average Household Size of Occupied Housing Units	-0.344**	-0.205**	-0.311**	-0.03
% of Households with Person 65 and Older Living Alone	0.411**	0.185**	0.305**	0.006
Informal Caregiver Support Ratio	-0.470**	-0.260**	-0.421**	-0.104**
Socio-Economic Factors				
Median Home Value	0.005	0.336**	-0.06	0.026
Median Household Income	-0.016	0.128**	0.019	-0.037
% Asian Descendent	-0.031	0.245**	-0.096**	0.045
% Hispanic Descendent	-0.163**	0.096*	-0.210**	0.117**
% Foreign Born	-0.079	0.294**	-0.0177**	0.089*
% Bachelor's Degree	0.078	0.343**	0.063	0.126**
% of Owner Occupied Householder 65 and Older & Moved in before 1980	0.277**	0.319**	0.236**	0.086*
% of Workforce in the Creative Class	-0.011	0.244**	-0.006	0.101**
Environmental Characteristics				
Population Density (Population per Square Mile)	-0.017	0.416**	0.096**	0.120**
% Using Public Transportation or Walk to Work	0.028	0.417**	0.039	0.081*
Physicians per 1,000 Residents	0.180**	0.503**	0.171**	0.199**
Employees in Higher Education per 1,000 Residents	0.130**	0.284**	0.146**	0.124**
Petris Social Capital Index (PSCI)	0.189**	0.358**	0.249**	0.146**

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

The largest correlation coefficient value in the study describes a strong positive linear relationship (0.538) between FBS employment per 1,000 residents and the percentage of the population that is 85 and older in small and medium MSA counties. The same variables demonstrate a strong, yet slightly weaker association (0.497) in large MSA counties. Additional population measures display a moderate to strong linear relationship with FBS employment per 1,000 residents. The percentage of county households with a resident 65 and over living alone has a correlation coefficient value of 0.411 in large MSA counties and 0.305 in small and medium MSA counties. The Informal Caregiver Support Ratio (ICSR) and average household size have negative linear relationships with FBS employment per 1,000 residents. Correlation coefficient values are -0.47 in large MSA counties and -0.421 in small and medium MSA counties for the Informal Caregiver Support Ratio, -0.344 in large MSAs, and -0.311 in small and medium MSAs for average household size. Population measures possess a notably stronger linear relationship with FBS than HCBS.

Several socio-economic factors and environmental characteristics show positive linear relationships with HCBS employment per 1,000 residents in large MSA counties. The percent of the population holding a bachelor's degree (0.343), median home value (0.336), and the percent of owner-occupied homes where the resident moved in before 1980 and is 65 or older (0.319) describe moderate relationships between HCBS employment per 1,000 residents and socio-economic variables. Environmental characteristics that illustrate a strong positive linear relationship with the HCBS employment rate per 1,000 residents in large MSA counties include the number of

physicians per 1,000 residents (0.503), percentage of the population that uses public transportation or walks to work (0.417), and population density (0.416); the PSCI (0.358) exhibits a moderate association. The variables quantifying socio-economic factors and environmental characteristics did not demonstrate moderate or strong linear relationships with HCBS in small and medium MSA counties or with FBS in counties of either MSA designation.

It is important to determine that the dependent variables have a linear relationship with the independent variables and that they are normally distributed; regression diagnostics will determine if specific assumptions are satisfied. Histograms and quantile probability plots analyze the normal distribution of the dependent variables. Outlier diagnostics illustrate observations that are distant from the remainder of the data, and identify unusual observations for the dependent variables. SPSS outlier diagnostics including the Cooks D procedure, recognize dependent variable cases that may inappropriately influence the regression model. Homoscedasticity, the assumption of homogeneity of variance, is expressed in residual plots. The errors or residuals should have a mean of zero and be homogenous. The assumption of low autocorrelation and that the residuals are independent and normally distributed is verifiable through the Durbin-Watson test, histograms, and P-P plots. The assumption of no multicollinearity is addressed in SPSS by a number of collinearity statistics including the variance inflation factor (VIF), condition index, and tolerance. The four regression models and their subsequent assumptions of normality, homoscedasticity, low autocorrelation, and no multicollinearity are tested using SPSS diagnostic tools.

The variance inflation factor (VIF), condition index, and tolerance are diagnostic statistics that gauge suitable levels of multicollinearity among predictor variables. VIF values under five are generally understood to represent acceptable multicollinearity; however, VIF values of three or less are preferable. The FBS and HCBS regression models have VIF values below two. Condition Index values between five and ten indicate weak multicollinearity, values between ten and 30 describe mediocre levels of multicollinearity, and values above 30 indicate strong multicollinearity. The largest condition index for the chosen models is under 12, and all are within acceptable parameters. The tolerance measures the influence of one independent variable on all other independent variables and indicates heighted levels of multicollinearity as the measure nears zero. A tolerance measured at < 0.1 may indicate multicollinearity, and a tolerance level of < 0.01 is a strong illustration of multicollinearity. All models and selected independent variables were significant at the $p < 0.001$ level.

There are several types of multiple regression techniques, which employ different methods of introducing independent variables into the statistical model. In stepwise multiple regression, the method of linear regression chosen for this dissertation, independent variables are entered according to their statistical contribution in explaining the variance in the dependent variable. Variables are added to the regression equation one at a time to create a model that utilizes the fewest variables to maximize the R-Square of the included variables. A stepwise regression analysis will investigate the linear relationship between absolute FBS and HCBS employment per 1,000 county

residents and specific population measures, socio-economic factors, and environmental characteristics.

Descriptive statistics summarize the quantitative data used in the four regression models. The average FBS and HCBS employment rates, representing employees per 1,000 residents for large MSA counties, are 7.748 and 5.41respectvely. The statistical mean, range, and standard deviation expressed by the 21 independent variables that describe large MSA counties are found in **Table 4.8**. The 436 counties comprising large MSAs are not homogenous, and many of the independent variables vary considerably. The percent population change from 2000 to 2013 ranges from a 35.32 percent population decline to 118.81 percent population increase. Median home values range from $74,000 to $828,100. Significant variation is found in the percent of the population with a college degree, the lowest being 8 percent and the highest 74 percent. The percentage of each county's population that is foreign born varies from 0.1 percent to just over 51 percent. Population density figures illustrate the substantial variation in urban intensity that exists within large MSA counties; the number of residents per square mile ranges from 6.8 to 70,919. An understanding of descriptive statistics provides a foundation for further statistical analysis and is necessary for interpreting results and drawing inferences (Spriestersbach et al., 2009).

Table 4.8. Descriptive Table of Independent Variables: Large Metro Areas > 1 Million Residents.

Independent Variable Name (Large Metro Areas > 1 Million)	**Mean**	**sd**	**Min**	**Max**
Population Measures				
% Population Change From 2000 to 2013	19.18	21.04	-35.32	118.81
% of Population 85 and Older	1.62	0.58	0.10	5.00
% of Baby Boomers (Population 50-69 Years Old)	24.43	3.20	15.80	38.30
% of Population 65 and Older with a Disability	35.79	5.38	17.80	53.40
% of Population 65 and Older with Cognitive Disability	8.88	2.49	1.20	19.70
Average Household Size of Occupied Housing Units	2.66	0.20	2.10	3.41
% of Households with Person 65 and Older Living Alone	9.10	2.26	3.79	16.99
Informal Caregiver Support Ratio	9.11	3.36	3.43	42.60
Socio-Economic Factors				
Median Home Value	209047.94	113249.00	74000	828100
Median Household Income	60194.89	15610.74	31060	122238
% Asian Descendent	3.42	4.64	0.06	34.38
% Hispanic Descendent	10.30	11.25	0.67	65.61
% Foreign Born	8.40	8.40	0.10	51.30
% Bachelor's Degree	27.66	11.73	8.20	74.40
% of Owner Occupied Householder 65 and Older & Moved in before 1980	37.10	12.31	5.70	70.29
% of Workforce in the Creative Class	25.31	7.42	9.25	51.22
Environmental Characteristics				
Population Density (Population per Square Mile)	1336.08	4562.48	6.80	70919.40
% Using Public Transportation or Walk to Work	5.28	8.79	0.30	79.60
Physicians per 1,000 Residents	0.64	0.38	0.00	3.46
Employees in Higher Education per 1,000 Residents	4.26	10.86	0.00	117.57
Petris Social Capital Index (PSCI)	8.19	7.48	0.94	108.00

4.3.1 Facility-Based Services Regression Analysis, Large MSA County

The chosen regression model for the rate of employment in Facility-Based Services per 1,000 residents by large MSA county explained 33 percent of the variation based on three predictor variables: The Informal Caregiver Support Ratio (ICSR), Percent of Population 65 and Over with a Cognitive Disability, and Percent Hispanic Descendent **(Model 3, Table 4.9)**. The chosen model articulates that for every point increase in the Informal Caregiver Support Ratio, the FBS employment rate per 1,000 residents will decrease by 0.775 points. The model also states that for every percentage point increase in the percent of the population 65 and over with a cognitive disability, employment in FBS per 1,000 workers will decrease by 0.363 points. Additionally, Model 3 states that for every percentage point increase in the population that identifies as Hispanic, the FBS employment rate per 1,000 residents will decrease by 0.059 points.

The standard estimate or standard coefficient, Beta or β in the table, offers a method to judge the strength of the predictor variable in a regression model. The relationship between the standard estimate and dependent variable can be measured by the absolute value of Beta. A higher Beta value indicates a more robust relationship with the dependent variable. The standard estimate is particularly useful because it allows an evaluation of the independent variables in a regression model regardless of the unit of measurement.

Table 4.9. Regression Models Indicating Associations between Independent Variables and the Total Employees in Facility-Based Services per 1,000 Resident by Large Metro County.

	Variable	Model R^2	b	SE b	β	p-value	VIF	CN
Model 1	Constant	0.247	15.001	0.621		0		1
	ICS Ratio		-0.787	0.067	-0.496	0	1	7.121
Model 2	Constant	0.303	18.448	0.844		0		1
	ICS Ratio		-0.779	6.50E-02	-0.491	0	1	6.403
	% 65 W / Cog Imp		-3.93E-01	6.80E-02	-0.237	0	1	10.708
Model 3	Constant	0.33	18.756	0.832		0		1
	ICS Ratio		-0.775	6.40E-02	-0.489	0	1.001	2.762
	% 65 W / Cog Imp		-3.63E-01	6.70E-02	-0.218	0	1.013	7.004
	% Hispanic		-0.059	1.40E-02	-0.165	0	1.013	11.679
Model 4	Constant	0.338	18.043	0.884		0		1
	ICS Ratio		-0.756	6.40E-02	-0.477	0	1.092	2.86
	% 65 W / Cog Imp		-3.47E-01	6.70E-02	-0.209	0	1.015	3.25
	% Hispanic		-6.00E-02	1.40E-02	-0.169	0	1.038	7.576
	% Petris Social Capital		0.05	2.20E-02	0.093	0.022	1.117	13.241

The standard estimate indicates that the Informal Caregiver Ratio, with a -0.489 standardized estimate, is the strongest predictor variable in the model. The standardized estimates for the Percent of Population 65 and Over with a Cognitive Disability (-0.218) and Percent Hispanic Descendent (-0.165) were not as pronounced. A one standard deviation (3.36) increase in the Informal Caregiver Support Ratio leads to a -0.489 standard deviation or a 2.06 decrease in the predicted FBS employment rate per 1,000 residents, with all other variables held constant. A one standard deviation increase in the Percent of Population 65 and Over with a Cognitive Disability (2.49) leads to a -0.218 standard deviation or a 0.92 decrease in the predicted FBS employment rate per 1,000

residents, with all other variables held constant. The final variable chosen for this model was the percent of the population that identified as being of Hispanic descent. A one standard deviation (11.25) increase in percent Hispanic descent leads to a -0.165 standard deviation or 0.7 decrease in employment in Facility-Based Services per 1,000 county residents.

The Petris Social Capital Index was the fourth predictive variable included in the stepwise regression model explaining the FBS employment rate per 1,000 residents for large MSA counties **(Model 4, Table 4.9)**. This model was not chosen due to a negligible increase, 0.008 in the R-Square value. The observed standard estimate for the Petris Social Capital Index predictor variable is 0.093, noticeably less than the other three predictor variables: -0.477 for the Informal Caregiver Support Ratio, -0.209 for the Percent of Population 65 and Over with a Cognitive Disability, and -0.169 for the percent of the population that is Hispanic.

The statistical analysis affirms the research hypothesis and is consistent with the literature, which states that the ICSR independent variable would have a negative relationship with formal LTC establishments, specifically FBS or more institutionalized care alternatives. The ICSR variable produced the largest Beta value in the regression analysis, and the correlation coefficient value (-0.470**) between ICSR and Facility-Based Services employment per 1,000 residents in large MSA counties shows a strong linear relationship. To fully understand the influence of informal caregivers on LTC employment and AIP opportunity, it is important to understand how much care is provided informally and where it is being provided.

Most LTC is administered at home by unpaid informal caregivers, comprised chiefly of family members and friends, who provide assistance with ADLs and IADLs (Stone, 2013). Empirical studies show that adequate levels of informal care will reduce the need of formal (HCBS and FBS) continuum-of care-alternatives and increase AIP opportunity (Charles and Sevak, 2005; Van Houtven and Norton, 2004). A decision to move to a FBS care setting is largely based on an evolving necessity of care. A lack of informal family caregivers often makes it difficult for older adults with disabilities to remain at home, and relocation to a residential care setting often takes place when informal caregivers are no longer sufficient and institutional care is required (Litwak and Longino, 1987). Informal caregivers are a critical component of AIP opportunity, and an inadequate caregiver support ratio heightens the need for formal continuum-of-care goods and services within the community.

The AARP, recognizing the significance of informal caregivers, defines a caregiver support ratio as the ratio of potential caregivers, the population between the ages of 45-64, to potential care recipients, the segment of the population that is 80 or older (Redfoot, Feinberg, and Houser, 2013). The aging of the baby boom generation is going to dramatically affect the supply as well as the demand for informal caregiving throughout the country. The caregiver ratio is projected to shrink from over seven potential caregivers per older person in 2010 to just four in 2030. A care gap is predicted to increase as the informal care ratio declines; by 2050 the population aged 80 or older is expected to be three times what it is today, and the caregiver ratio is predicted to fall below three to one (Redfoot, Feinberg, and Houser, 2013).

It is important to be aware of present geographic concentrations of informal caregivers as well as future demographic trends that will affect the caregiver support ratio. The Informal Caregiver Support Ratio is distributed unevenly throughout large MSA counties **(Figure 4.5)**. The 436 counties comprising large MSAs are not homogenous, and ICSR values vary considerably. The average county in a large MSA has an ICSR of 9.11, varying from a high of 42.6 in Manassas Park city, Virginia, to a low of 3.43 in Palm Beach County, Florida. Substantial concentrations of high ICSR values are seen in the Atlanta-Sandy Springs-Roswell, GA MSA, the Denver-Aurora-Lakewood, CO MSA, as well as in multiple metropolitan areas in Texas and Virginia.

More importantly, this research focuses on identifying concentrations of counties with low ICSR values. The Providence-Warwick RI-MA MSA and Pittsburgh metro area stand out as well as numerous large metro counties in Virginia and New York. Low ICSR values indicate a possible informal care gap and identify a likely need for formal continuum-of-care resources. These locations are prevalent in the "rust belt" and former industrial centers that have experienced population decline, mainly from out-migration, and economic contraction. Additionally, low ICSR values are visible in multiple large metropolitan counties of Florida, which remains a popular retirement destination. The regression analysis identified an inverse relationship between the ICSR and FBS employment in large MSA counties. The influence of the ICSR on the FBS top twenty-five rankings for large MSA counties is significant; nine of the ranked counties are more than one standard deviation below the ICSR mean.

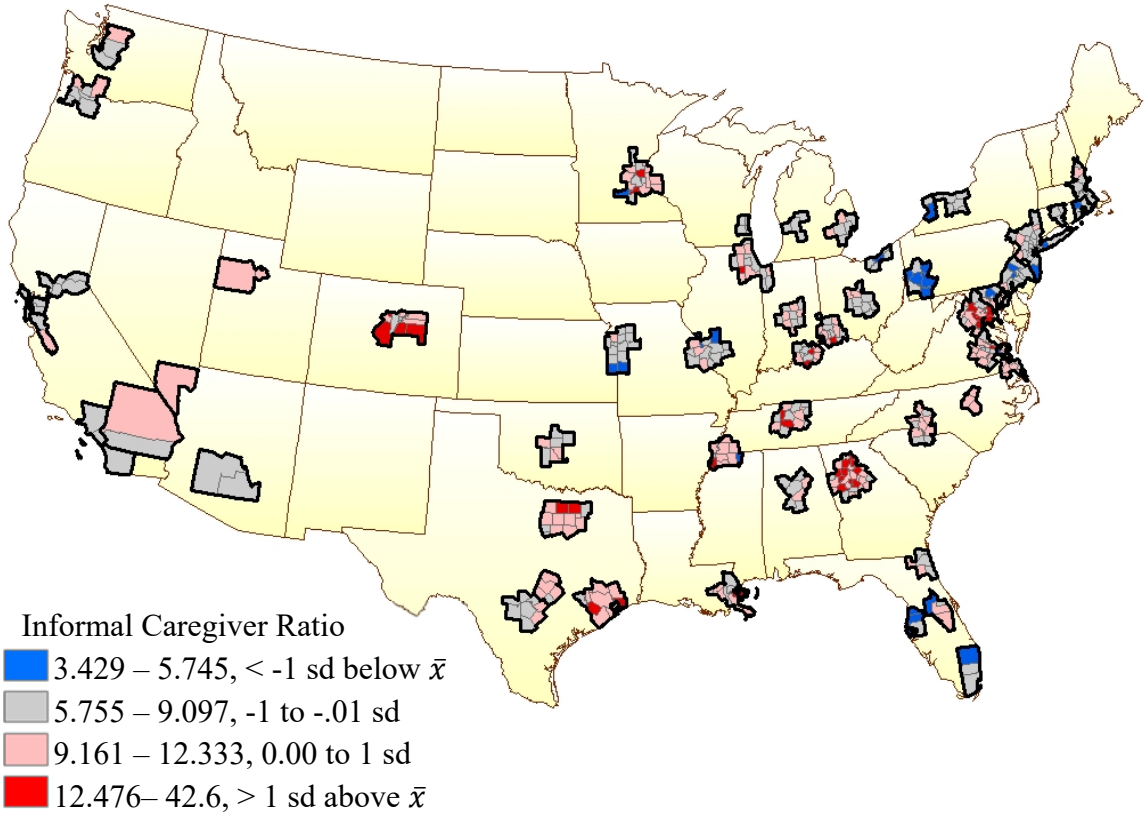

Figure 4.5. Informal Caregiver Support Ratio by Large MSA County, 2009-2013 Average. The average ($\bar{x}$) for the 436 Large MSA counties is a 9.108 Caregiver Support Ratio.

The second predictor variable chosen in the stepwise regression model for FBS employment in large MSA counties is the percent of the population 65 or older with cognitive impairment. The negative relationship between cognitive impairment and FBS employment was not expected, as this predictor variable was meant to identify vulnerable populations and geographies of potential LTC need. Maintaining high cognitive function is a major component of the Successful Aging Model (Rowe and Kahn, 1987) and is necessary for older adults to live independently. There are many community-based care options including Senior Centers and Adult Day Healthcare Facilities that provide

programs designed to promote social interaction and maintain cognitive functionality (Lehning, Chun, and Scharlach, 2007). Facility-Based Services, specifically nursing homes, are largely inhabited by older adults who require elevated levels of care because of existing moderate to severe cognitive impairment (Cuijpers, Lammeren, and Duzijn, 1999; Gosney, Tallis, and Edmond, 1990; Quinn et al., 1999). The percent of the population with cognitive impairment may not have a positive relationship with FBS employment because FBS do not normally serve those with mild cognitive impairment and tend to be populated by less affluent residents (Spore, Mor, Hiris, Larrat, and Hawes, 1995).

Research does indicate that higher rates of cognitive impairment exist for individuals living in a LTC facility or receiving institutional care. It is estimated that in 2011, between 41 percent and 68 percent of nursing home residents had moderate or severe cognitive impairment (USDHHS, 2013). The majority of people with cognitive impairment reside within the community rather than in a facility. The spatial distribution of cognitive impairment within large MSA counties **(Figure 4.6)** is worth further investigation because of the increasing prevalence of dementia and other cognitive disabilities, particularly Alzheimer's Disease, among LTC consumers.

The percent of the population that is 65 or older and living with a cognitive disability varies noticeably across large MSA counties. On average, 8.88 percent of residents 65 or older are living with some sort of cognitive disability. The largest percentage of cognitive disability among residents 65 and older (19.7 %) is in Petersburg city, Virginia; the lowest (1.2%) is in Park County, Colorado. Concentrations of

populations with high percentages of cognitive impairment are particularly noticeable in southern metro counties, stretching from central Virginia through the Carolinas and into Tennessee, Alabama, Mississippi, Louisiana, Texas, and southern California. Clusters of counties with low percentages of cognitive impairment are particularly visible in the Denver-Aurora-Lakewood, CO and Minneapolis-St. Paul-Bloomington, MN-WI MSAs.

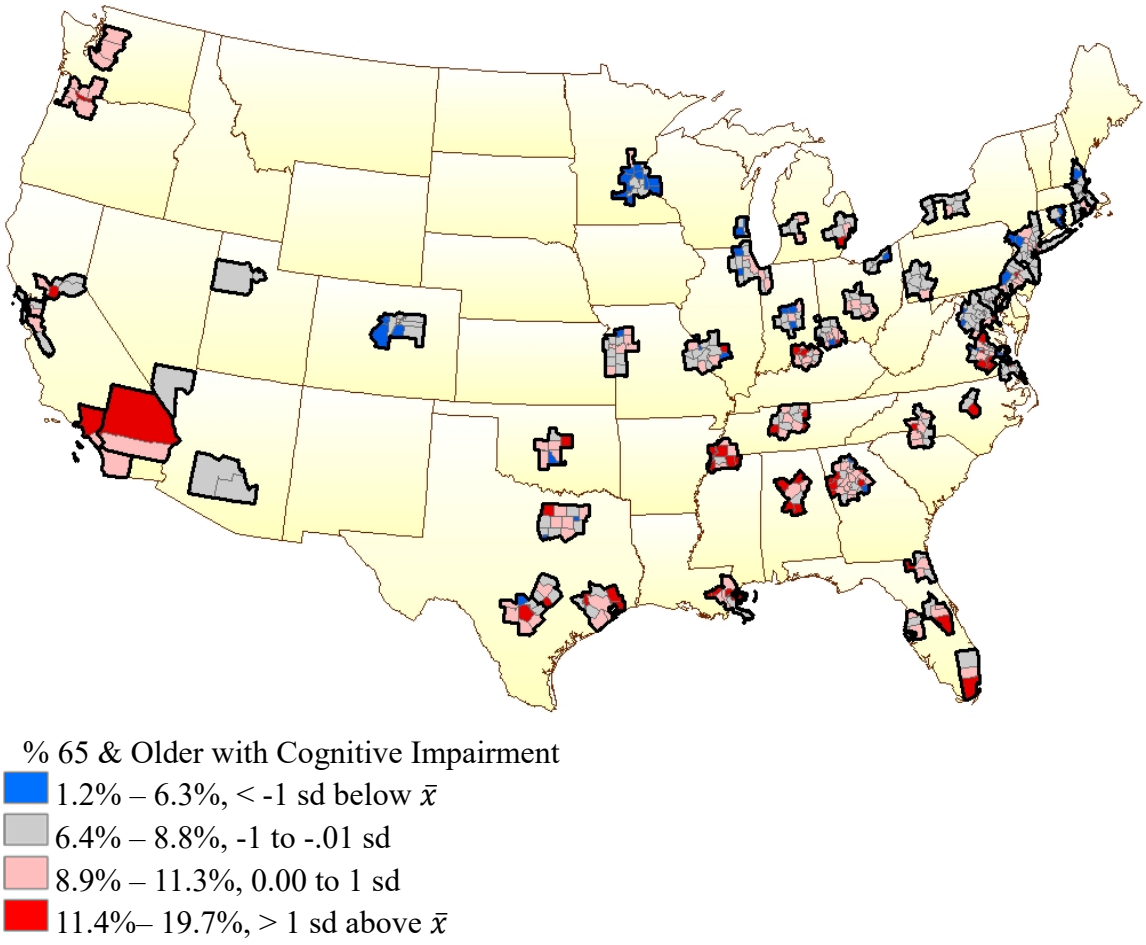

Figure 4.6. Percent 65 and Older with Cognitive Impairment by Large MSA County, 2009-2013 Average. The average ($\bar{x}$) for the 436 Large MSA counties is 8.876 percent of the population 65 and older have cognitive impairment.

The regression analysis illustrated an inverse relationship between the percent of the population 65 and older with cognitive impairment and FBS employment. Low percentages of cognitive impairment impact the FBS top twenty-five rankings for large MSA counties. Ten of the ranked counties are more than one standard deviation below the mean percentage of cognitive impairment for large MSA counties including Fairfax city (ranked 1st), Williamsburg city (ranked 14th), and Clinton County (ranked 23rd), which are approximately two standard deviations below the mean.

The third and final predictor variable to be included in the FBS large MSA county regression model is the percentage of the population that identifies as Hispanic. Cultural justification is a concept used to describe the influence of cultural values and beliefs on caregiving behavior and practice (Dilworth-Anderson et al., 2005). Research indicates that the Hispanic population, more than non-Latino whites, prefer informal over formal caregivers (Min and Barrio, 2009). Furthermore, Feng et al. (2011) contend that as the Hispanic population increases, state spending on institutional long-term care per capita decreases. The negative Beta value in the regression analysis supports this notion and shows that an increase in the proportion of a county's Hispanic population leads to a decrease in FBS employment per 1,000 residents. The spatial distribution of Hispanics is uneven and concentrated in specific regions of the country **(Figure 4.7)**.

Large MSAs are not homogenous, and the populations of the 436 counties comprising large MSAs possess varying percentages of residents who identify as Hispanic. The mean percentage of Hispanic residents in large MSA counties is 10.3 percent, varying from a high of 65.6 percent in Miami-Dade County, Florida, to a low of

0.67 percent in Armstrong County, Pennsylvania. As expected, pronounced concentrations of Hispanic populations are found in large MSA counties in Florida, Texas, Arizona, and California. Large metro areas in western Pennsylvania, Ohio, Indiana, and Illinois show well below average Hispanic populations.

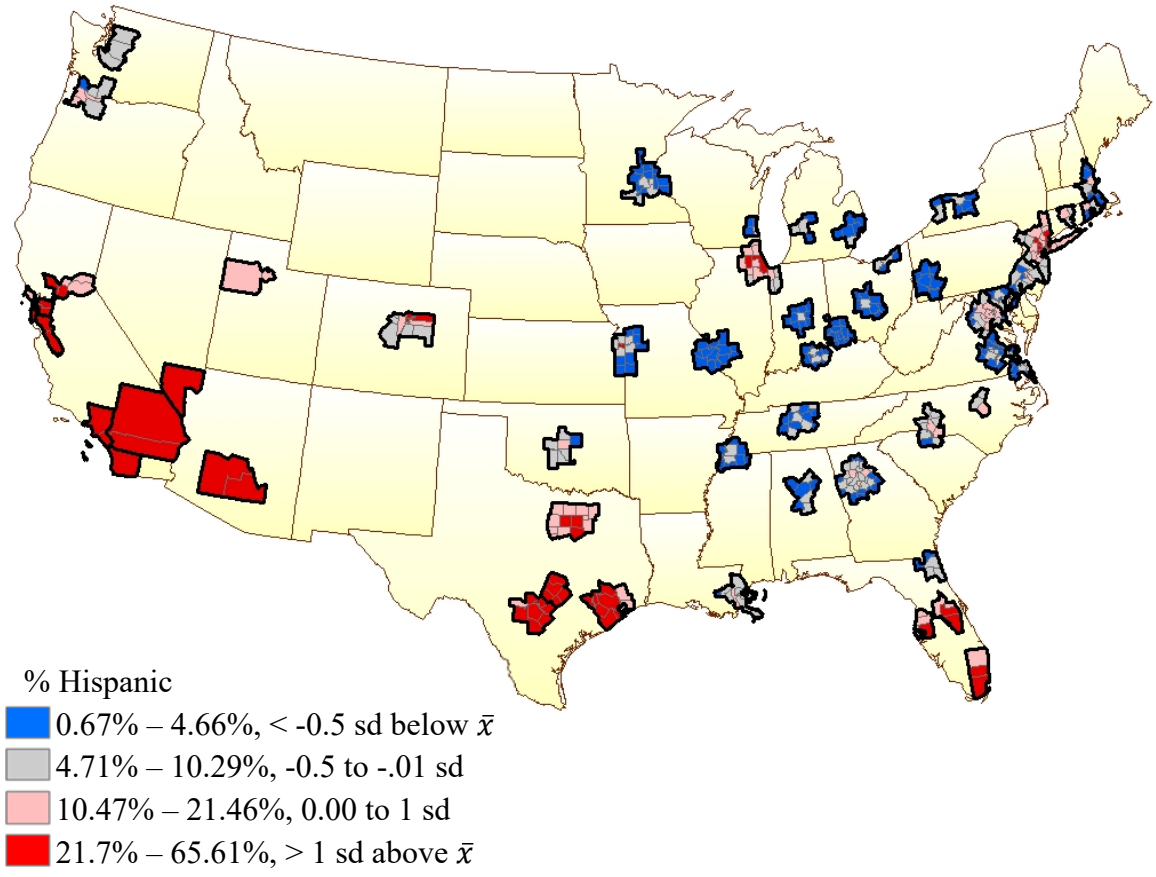

Figure 4.7. Percent Hispanic by Large MSA County, 2009-2013 Average. The average ($\bar{x}$) for the 436 Large MSA counties is 10.299 percent of the population identify as Hispanic.

The regression analysis identified an inverse relationship between the percent of the population that identifies as Hispanic and FBS employment in large MSA counties. The impact of this relationship is revealed in the FBS top twenty-five for large MSA

counties, in which all but four counties fall below the mean. An additional four counties including Mille Lacs County (ranked 8th), Jersey County (ranked 9th), Scott County (ranked 18th), and Geauga County (ranked 24th) are more than 0.75 standard deviation below the mean for percent Hispanic. Immigrants tend to endorse collectivist cultural values and are less likely to seek out formal services than native-born residents (Lee and Eaton, 2009). Cultures that accentuate familial care can mitigate the necessity for more formal LTC services. Like the Informal Caregiver Support Ratio predictor variable, the percent Hispanic predictor variable is meant to measure the presence of potential informal caregivers. Large concentrations of Hispanic residents are likely to identify geographies where familial support structures exist and informal LTC provision is likely prioritized over formal continuum of care alternatives.

4.3.2 Home and Community-Based Services Regression Analysis, Large MSA County

The chosen regression model for employment in Home and Community-Based Services per 1,000 residents in large MSA counties explained 37 percent of the variation. The model is based on three predictor variables: Number of Physicians per 1,000 Residents, Population Density (average population per square mile), and the Percent of Owner-Occupied Householder 65 and Over that Moved in before 1980 **(Model 3, Table 4.10)**.

Table 4.10. Regression Models Indicating Associations between Independent Variables and the Total Employees in Home and Community-Based Services per 1,000 Residents by Large Metro County.

	Variable	Model R^2	b	SE b	β	p-value	VIF	CN
Model 1	Constant	0.239	0.909	0.484		0.061		1
	Physicians per 1K Pop		7.297	0.641	0.489	0	1	3.695
Model 2	Constant	0.336	1.069	0.454		0.019		1
	Physicians per 1K Pop		6.22	6.15E-01	0.417	0	1.054	1.597
	Pop Density		5.10E-06	0.00E+00	0.319	0	1.054	3.932
Model 3	Constant	0.372	-1.959	0.764		0.011		1
	Physicians per 1K Pop		5.784	6.06E-01	0.387	0	1.078	1.864
	Pop Density		3.58E-04	4.90E-05	0.293	0	1.072	4.136
	%OOMB1980		0.09	1.80E-02	0.195	0	1.051	7.767
Model 4	Constant	0.382	-3.785	1.039		0.068		1
	Physicians per 1K Pop		5.792	6.02E-01	0.388	0	1.078	2.109
	Pop Density		5.10E-06	0.00E+00	0.289	0	1.074	4.483
	%OOMB1980		7.20E-02	2.00E-02	0.156	0	1.2	8.236
	%HH65Living Alone		0.275	1.07E-01	0.107	0.005	1.155	11.768

The chosen model describes that for every point increase in the rate of physicians per 1,000 residents, the HCBS employment rate per 1,000 residents will increase by 5.784 points. The model also states that for every point increase in population density, employment in HCBS per 1,000 workers will increase by 0.000358 points. The final variable chosen for the model is the percent of owner-occupied householder 65 and over that moved into their homes before 1980. The regression model predicts that for every percentage point increase in this variable, the HCBS employment rate per 1,000 residents will increase by 0.09 points.

The standard estimate indicates that rate of physicians per 1,000 residents was the strongest predictor variable in the model, with a 0.387 standard estimate. The standardized estimate for additional predictor variables chosen for the model include

population density (0.293) and the percent of owner-occupied householder 65 and over that moved into their homes before 1980 (0.195). A one standard deviation (0.38) increase in physicians per 1,000 residents leads to a 0.387 standard deviation, or 2.2-point increase in the predicted HCBS employment rate per 1,000 residents, with all other variables held constant. A one standard deviation (4562.48) increase in population density points to a 0.293 standard deviation or 1.67 rise in HCBS employment per 1,000 residents, with other variables in the model held constant. The percentage of owner-occupied householders 65 and over that moved into their homes before 1980 is the weakest predictor variable chosen for the model and states that a one standard deviation (12.31) increase in this percentage will facilitate a 0.195 increase in the HCBS employment rate per 1,000 residents in large MSA counties.

The percent of county households that are comprised of an individual 65 or older who lives alone was the fourth predictive variable included in the stepwise regression model **(Model 4, Table 4.10)**. Model 4 exhibited an R-Square value increase of 0.01, and the standard estimate for the percent of county households that are comprised of an individual 65 or older who lives alone is 0.107. The standard estimate is considerably less than the predictor variables chosen: 0.388 for the rate of physicians per 1,000 county residents, 0.289 for population density, and 0.156 for the percent of owner-occupied householders 65 and over that moved into their homes before 1980. The slight increase in the R-Square value or explanation of the variance coupled with a low standard estimate for a fourth predictor variable supports the choice of Model 3 as most parsimonious.

The rate of physicians per 1,000 residents is the most influential of the predictor variables chosen in the stepwise regression model describing HCBS employment within large MSA counties. This result is consistent with the research hypothesis, which embraces the notion that physicians per 1,000 residents is a good proxy for a community's healthcare capacity. HCBS establishments administer home-based medical care and social services that allow residents to remain in their homes as they age. Common home medical care includes physician services, dementia programs, mental health services, adult day health programs, and medication management and/or assistance (AHCA, 2004). Although most formal LTC, whether in a facility or in the home, is administered by paraprofessionals or direct care workers, counties with significant deficits in physician care will not be able to provide adequate LTC. Physician shortages present a challenge that will only increase as populations age. A county's healthcare capacity, often gauged by the supply of physicians and hospitals, now includes a myriad of Home and Facility based LTC alternatives.

The distribution of physicians per 1,000 large MSA county residents **(Figure 4.8)** is uneven, illustrating potential care gaps and vulnerable populations. Access to care is a critical component of successful healthcare provision. Significant variation in the presence of physicians is evident in large MSA counties. The average county in a large MSA has a rate of 0.64 physicians per 1,000 residents. The highest rate of physicians per 1,000 residents (3.46) can be found in Falls Church city, Virginia, while six counties (Benton County, Mississippi; Clear Creek County, Colorado; Elbert County, Colorado;

Ohio County, Indiana; Manassas Park city, Virginia; and Skamania County, Washington) reported no physicians.

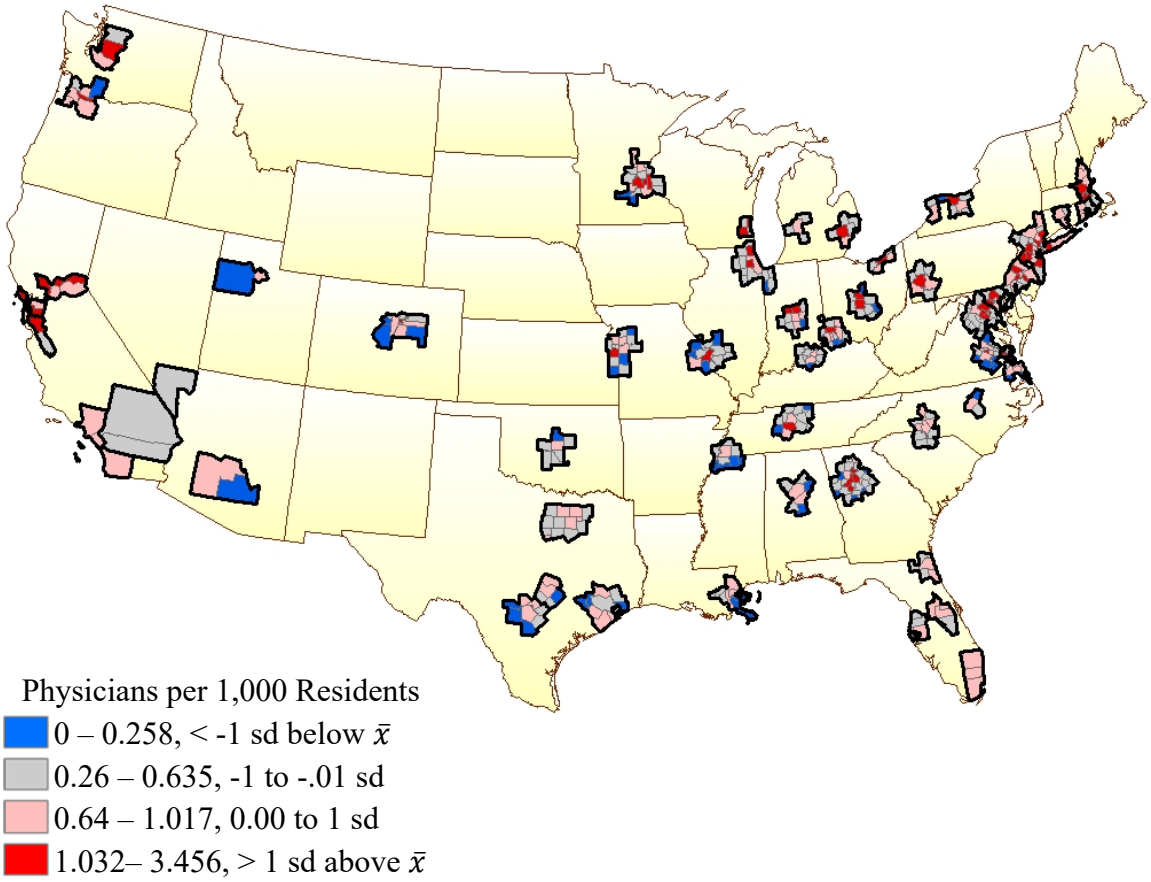

Figure 4.8. Physicians per 1,000 Residents by Large MSA County, 2013 Average. The average ($\bar{x}$) for the 436 Large MSA counties is a 0.64 Physicians per 1,000 Residents.

The regression analysis indicated a positive relationship between physicians per 1,000 residents and HCBS employment per 1,000 residents in large MSA counties. Counties with high rates of physicians per 1,000 residents are found in most large MSAs and are particularly visible in central counties. Falls Church city, Virginia, holds the top HCBS employment rate per 1,000 residents as well as the top rate of physicians per 1,000

residents for large MSA counties, highlighting the significance of the relationship between the two variables. An additional ten counties in the large MSA HCBS top twenty-five are over one standard deviation above the mean for physicians per 1,000 residents; six of these counties are classified as central counties by the NCHS classification system.

The second variable chosen for the HCBS regression analysis in large MSA counties is population density. The positive influence of population density on HCBS provision was expected and is consistent with literature stating densely populated areas provide economies-of-scale advantages that allow health and social support services to be administered more efficiently (Golant, 2008). HCBS are most effective when service providers can minimize transportation costs and delivery time (Evashwick and Holt, 2000). Population Density, used by the U.S. Census Bureau to measure urban intensity, is a good proxy for measuring and identifying urban and rural environments. Urban areas are generally better able to deliver a broad array of community services and housing options; it is often more challenging to provide home-based services in remote rural locations (Golant, 2003). Urban geographers, exploring the connection between aging and place, contend that addressing transportation, housing, and mobility needs of older adults is critical to combating social isolation and maintaining a sense of purpose (Cloutier-Fisher and Joseph, 2000). The population density of large MSA counties is illustrated in (**Figure 4.9)**.

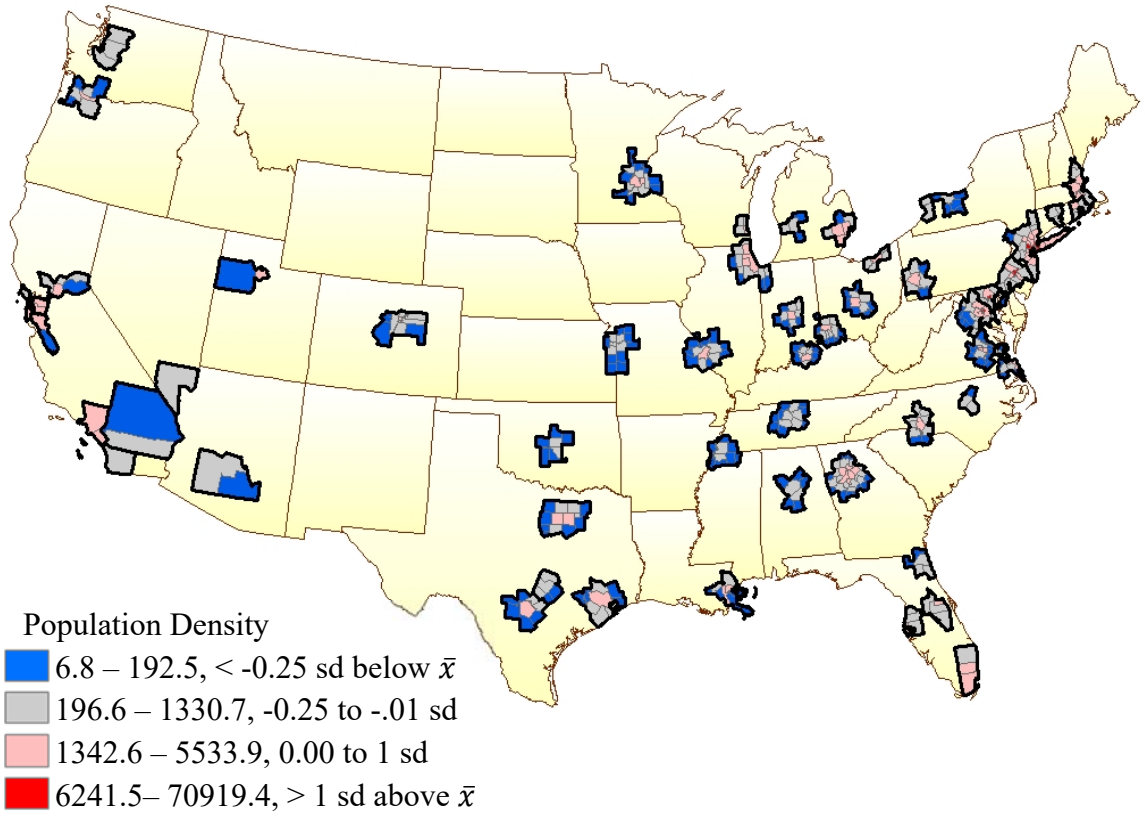

Figure 4.9. Population Density by Large MSA County, 2009-2013 Average. The average ($\bar{x}$) for the 436 Large MSA counties is 1336.08 persons per square mile.

The 436 counties comprising large MSAs represent tremendous range in built environment and population density. The average county in a large MSA contains 1,136 residents per square mile, varying from a high of 70,919 in New York County, New York, to 6.8 in Skamania County, Washington. Population density is determined by many factors including geography, urban form, and public policy. Densely populated large MSA counties are prominent along the northeast corridor, specifically along Interstate 95, encompassing metro counties from Washington D.C., through Philadelphia, New York into Boston and New England.

The regression analysis supports previous research and shows a positive relationship between population density and HCBS employment per 1,000 residents in large MSA counties. The New York-Newark-Jersey City, NY-NJ-PA MSA exemplifies this relationship and is the most pronounced cluster of densely populated counties in the United States. The four most densely populated counties in the country are in the New York metro area. New York County (70,919), Kings County (36,278), Bronx County (33,455), and Queens County (20,941) have more than 20,000 residents per square mile and are over four standard deviations above the mean for population density in large MSA counties. In addition to these four New York counties, Falls Church city (6,615) is in the large MSA HCBS top twenty-five rankings and is over one standard deviation above the population density mean. As was the case with counties possessing high physician employment rates per 1,000 residents, many of the most densely populated large MSA counties are classified as central counties by the NCHS classification system including New York County, Kings County, Bronx County, and Queens County.

The third variable selected to predict HCBS employment in large MSA counties is the percentage of households comprised of people 65 or older, who moved into their homes before 1980. This variable is meant to provide valuable information as to the presence of Naturally Occurring Retirement Communities (NORCs), geographically defined areas with high concentrations of older adults (Hunt, M. E., and Gunter-Hunt, G., 1986). A NORC is a community that has naturally developed and contains a high percentage of older residents because seniors either remained in or moved to these communities when they retired (Carpenter et al., 2007; Ivery et al., 2010). NORCs

encompass a variety of forms and may include communities of apartments or condominiums as well as neighborhoods of single-family homes. In 2006, there were an estimated 4,500 NORCs in the United States, including horizontal models (high-rise buildings), vertical models (single, semi-detached, or attached housing in close proximity), and neighborhood models that combine the two (Piturro, 2006).

The first NORCS began to appear in New York City in the 1980s and were expanded by the United Jewish Federation to include NORC Supportive Service Programs (NORC SSPs). In 2012, more than 50,000 older adults in New York City live in NORCs, and the associated Supportive Service Programs employ minimal staff, instead relying heavily on volunteers (Greenfield et al., 2012). The Village to Village Network, which began in the Beacon Hill neighborhood of Boston in 2002, is a local movement to promote community-based supportive services and health care to allow residents to age in place (Greenfield, Scharlach, and Lehning, 2012). Villages usually emerge from a NORC and aim to procure staff from within the community to coordinate services and programs to help members remain in their homes (McWhinney-Morse, 2009).

The presence of this variable within the chosen regression model was expected; high concentrations of older adults provide economies of scale that are conducive to HCBS consumption. Examining these locations **(Figure 4.10)** may provide valuable insight into where and how AIP resources and strategies are being implemented successfully and identify locations that would most benefit form AIP and HCBS providers. On average, 37.1 percent of the owner-occupied households contains someone

65 or older, who moved into the home before 1980. The largest percentage (70.3%) is in St. James Parish, Louisiana; the lowest percentage (5.7%) is in Hernando County, Florida.

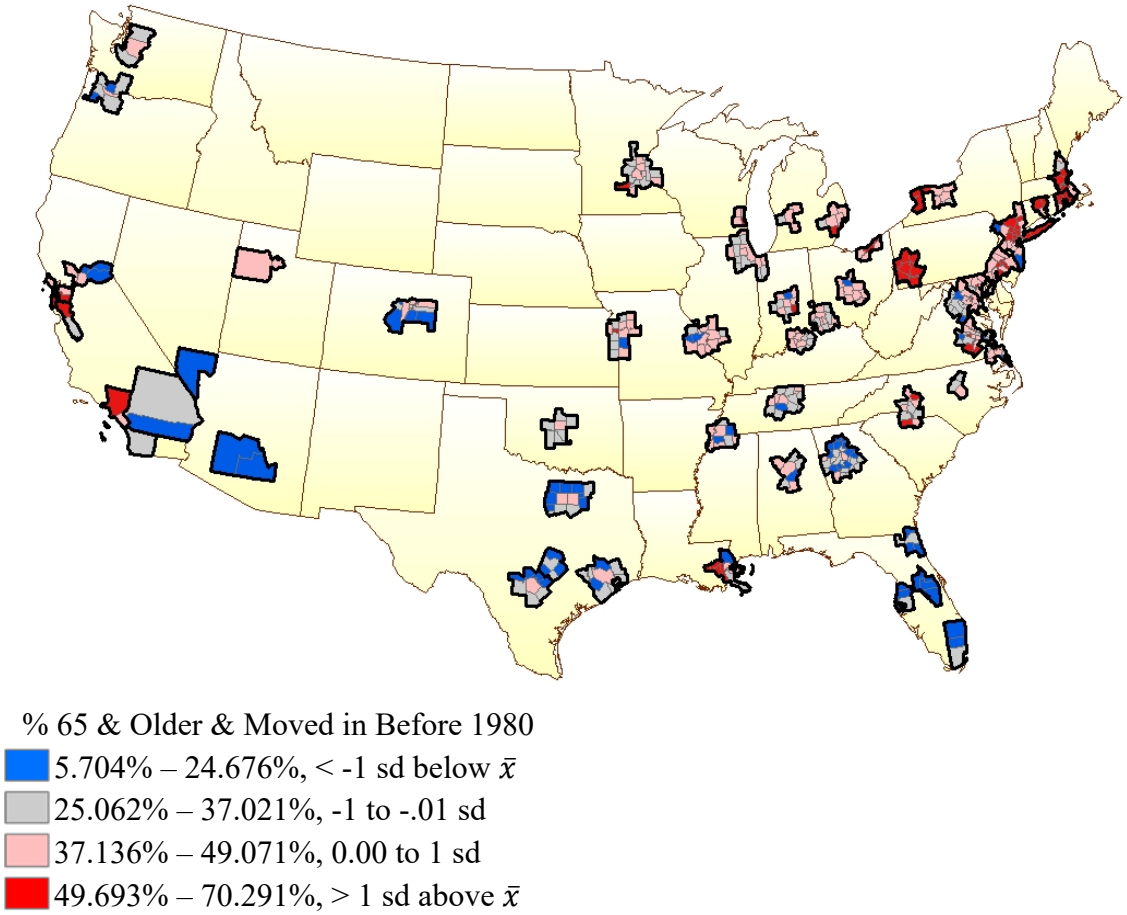

Figure 4.10. Percent 65 and Older that Moved into Their Home Before 1980 by Large MSA County, 2009-2013 Average. The average ($\bar{x}$) for the 436 Large MSA counties is 37.1 percent of the population 65 and older moved into their home before 1980.

Concentrations of older adults who purchased their current home before 1980 are particularly prevalent in the metropolitan areas along the Interstate 95 corridor from Washington, D.C. through New England, a cohesive urbanized area that has been coined

the Northeast Megalopolis (Gottmann, 1961). All counties within the Buffalo-Niagara Falls and Pittsburgh metropolitan areas are over one standard deviation above the mean for this NORC measurement in large MSA counties. Multiple counties in the San Francisco-Oakland-Hayward, CA; Atlanta-Sandy Springs-Roswell, GA; and New Orleans–Metairie MSAs are over one standard deviation above the mean for this potential NORC measurement as well. The regression analysis describes a positive association between high percentages of older adults who own their homes and have resided there since 1980 and HCBS employment per 1,000 residents in large MSA counties. The relationship between the variables is strong: eleven counties in the large MSA HCBS top twenty-five have NORC values over 50 percent, which is over one standard deviation above the mean.

4.3.3 FBS Regression Analysis, Small and Medium MSA County

The Facility-Based Services dependent variable for counties in small and medium MSAs has a higher mean (9.15) than counties in large metropolitan areas over one million residents (7.75). This figure may be attributed to these counties having a higher percentage of older adults, specifically residents 85 and older. The purpose of the regression models for counties in metro areas under one million residents is similar to the models used to examine large MSAs. Stepwise regression techniques are employed to determine the most parsimonious model while taking into account acceptable diagnostic parameters. The descriptive statistics for the independent variables used to illustrate the small and medium MSAs are presented in **Table 4.11**.

Table 4.11. Descriptive Table of Independent Variables (Small/Medium Metro Areas).

Independent Variable Name (Small / Medium Metro Areas)	Mean	sd	Min	Max
Population Measures				
% Population Change From 2000 to 2013	11.36	15.49	-38.78	106.61
% of Population 85 and Over	1.90	0.68	0.10	5.10
% of Baby Boomers (Population 50-69 Years Old)	24.95	3.78	8.90	44.40
% of Population 65 and Older with a Disability	38.50	6.07	24.90	62.50
% of Population 65 and Older with Cognitive Disability	9.60	3.02	3.40	23.10
Average Household Size of Occupied Housing Units	2.56	0.23	1.39	3.76
% of Households with Person 65 and Older Living Alone	10.50	2.47	3.48	21.74
Informal Caregiver Support Ratio	7.56	2.88	2.72	55.00
Socio-Economic Factors				
Median Home Value	144401.23	61449.63	0.00	557500
Median Household Income	48017.28	9288.66	22545	85672
% Asian Descendent	1.74	2.60	0.00	42.56
% Hispanic Descendent	8.97	12.97	0.52	95.27
% Foreign Born	5.05	5.11	0.10	33.40
% Bachelor's Degree	22.27	8.71	5.70	58.30
% of Owner Occupied Householder 65 and Older & Moved in before 1980	38.87	11.56	0.00	67.95
% of Workforce in the Creative Class	20.51	5.18	8.24	42.62
Environmental Characteristics				
Population Density (Population per Square Mile)	223.33	342.59	0.70	4292.60
% Using Public Transportation or Walk to Work	3.41	2.81	0.20	32.80
Physicians per 1,000 Residents	0.61	0.40	0.00	4.73
Employees in Higher Education per 1,000 Residents	3.96	11.14	0.00	171.12
Petris Social Capital Index (PSCI)	7.40	3.80	0.00	28.90

The chosen regression model describing employment in Facility-Based Services per 1,000 residents in small and medium MSA counties explains 34 percent of the variation based on two predictor variables **(Model 2, Table 4.12)**. This is slightly more than the 33 percent that the model explained for FBS employment in large MSAs. The predictor variables for small and medium MSAs include the percent of population 85 and

over and the percent of owner-occupied householder 65 and over who moved into their home before 1980.

The two predictor variables are completely different than those used in the regression model for FBS employment in large MSAs; however, the percent of owner-occupied householder 65 and over who moved into their home before 1980 was included in the chosen HCBS regression model for large MSAs. The b coefficients for Model 2 state that the Facility-Based employment rate per 1,000 residents in counties within small and medium MSAs will increase by 4.2 points for each percentage increase in the county's population 85 and older. The model also states that for every percentage increase in owner-occupied householder 65 and over who moved into their home before 1980, the FBS employment rate per 1,000 residents will increase by 0.08 points.

The standard estimate indicates that the percentage of county residents 85 or over is the strongest predictor variable in the model, with a 0.542 standardized estimate. The standardized estimate for the percent of owner-occupied householder 65 and over who moved into their home before 1980 (0.178) is not as pronounced. A one standard deviation (0.676) increase in the percentage of the population 85 or older leads to a 0.542 standard deviation or a 2.9 increase in the predicted rate of FBS employment per 1,000 residents, with all other variables held constant. A one standard deviation increase in the percent of owner-occupied householder 65 and over who moved into their home before 1980 (11.56) leads to a 0.178 standard deviation or a 0.956 increase in the predicted FBS employment rate per 1,000 residents, with all other variables held constant.

The third predictor variable chosen by the stepwise regression model to describe FBS employment in small and medium MSA counties is the percentage of the county population that is foreign born **(Model 3, Table 4.12)**. This model was not chosen largely because of the small (0.14) increase in the R-Square value. The observed standard estimate for the percentage of foreign-born county residents is -0.122, smaller than standard estimates for the percentage of county residents 85 and older (0.533) and the percent of owner-occupied householder 65 and over who moved into their home before 1980 (0.147).

Table 4.12. Regression Models Indicating Associations between Independent Variables and Total Employees in Facility-Based Services per 1,000 Residents by Small and Medium Metro County.

	Variable	Model R^2	b	SE b	β	p-value	VIF	CN
Model 1	Constant	0.312	1.21	0.495		0.015		1
	% 85 & Over		4.357	0.245	0.559	0	1	5.984
Model 2	Constant	0.343	-1.679	0.697		0.016		1
	% 85 & Over		4.228	2.40E-01	0.542	0	1.009	5.829
	%OOMB1980		8.00E-02	1.40E-02	0.178	0	1.009	9.3
Model 3	Constant	0.357	-0.375	0.768		0.626		1
	% 85 & Over		4.155	2.39E-01	0.533	0	1.015	2.733
	%OOMB1980		6.70E-02	1.40E-02	0.147	0	1.075	6.36
	% Foreign Born		-0.124	3.20E-02	-0.122	0	1.077	11.062
Model 4	Constant	0.371	5.112	1.587		0.001		1
	% 85 & Over		4.682	2.71E-01	0.6	0	1.341	3.017
	%OOMB1980		5.20E-02	1.50E-02	0.114	0	1.154	7.168
	% Foreign Born		-1.89E-01	3.60E-02	-0.185	0	1.368	9.887
	%Baby Boomer		-0.225	5.70E-02	-0.152	0	1.65	28.568

The percentage of county residents 85 and older is the most influential variable in predicting FBS employment per 1,000 residents in small and medium MSA counties. The strength of the predictor variable was expected based on review of literature and the strong positive correlation coefficient value (0.538**). In fact, it was surprising that this

predictor variable was not chosen in the FBS regression model for large MSA counties. A large concentration of older adults in a county likely indicates a retirement community, an aged population, or both. Older demographic groups require more care, particularly populations 85 and above (Grabowski, 2006). A negative relationship with dependent variables will identify vulnerable populations and gaps in Continuum of Care and AIP opportunity.

Geographic concentrations of older adults primarily result from aging in place or in migration. The vast majority of seniors will remain in their community as they age (Longino, Perzynski, and Stoller, 2002). Population aging, largely influenced by the baby boomer generation desire to age in community, is taking place throughout the United States (Andrews et al., 2007). The U.S. Census Bureau projects that the population age 85 and over could grow from 6 million in 2014 to 20 million by 2060, presenting significant challenges and opportunities for establishments dedicated to LTC provision.

Figure 4.11 shows that the oldest age cohort is distributed unevenly throughout small and medium MSA counties; identifying geographic concentrations of older adults is necessary to provide appropriate levels of LTC (Andrews and Phillips, 2005; Joseph and Hallman, 1998). Counties in the Great Plains, the "rust belt" of the Midwest, and central Pennsylvania and New York show high percentages of older adults. The most pronounced proportions of older adults in small and medium MSA counties are in Florida. High percentages of older residents in many Florida counties are a direct result of retirement in-migration.

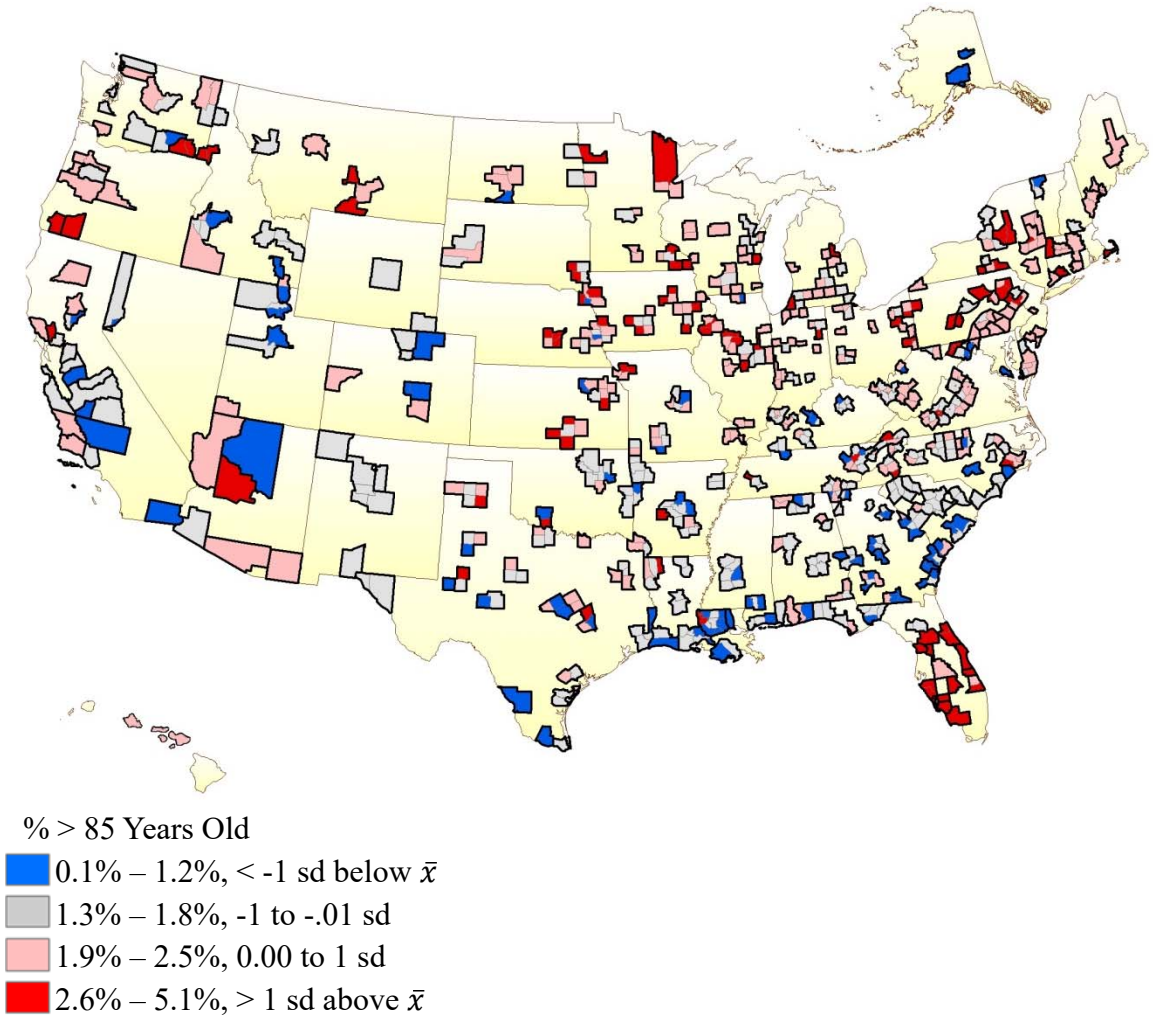

Figure 4.11. Percent of Population 85 and Older by Small/Medium MSA County, 2009-2013 Average. The average ($\bar{x}$) for the 731 Small/Medium MSA counties is 1.9 percent of the population is 85 and older.

The 731 counties comprising small and medium MSAs differ in many ways, and the percentage of each county's population that is 85 or older varies greatly. The average county in a small and medium MSA has a population where 1.9 percent of the residents are 85 or older. Concentrations of older adults are unevenly distributed across small and medium MSA counties; the largest percentage of residents 85 or older (5.1%) is in

Sarasota County, Florida; the smallest (0.1%) can be found in Chattahoochee County, Georgia. The regression analysis describes a positive relationship between high percentages of older adults (85 years and older) and increased FBS employment per 1,000 residents in small and medium MSA counties. Five counties in the small and medium MSA FBS top twenty-five are more than two standard deviations above the mean for the percent of their population that is 85 years or older including Bedford city (ranked 2nd), Ford County (ranked 5th), Harvey County (ranked 7th), Montour County (ranked 9th), and Fillmore County (ranked 12th).

The second predictor variable for FBS employment in small and medium MSA counties is the percent of the population 65 and over who moved into their homes before 1980. The selection of this variable for the model was somewhat unexpected and mainly thought to affect older adults' ability to remain in their homes by making their locations more attractive to HCBS providers. The lower populations of small and medium MSA counties may affect the significance of the predictor variable. **Figure 4.12** illustrates an uneven distribution of the percentage of this population.

The geographic distribution of households containing individuals 65 or older who moved into their homes prior to 1980 in small and medium MSA counties is similar to the distribution of the independent variable in large MSA counties. On average, in small and medium MSA counties, 38.9 percent of owner-occupied households includes people 65 or older who moved into their homes before 1980. The largest percentage (68%) is located in Brooke County, West Virginia; the lowest percentage (0.0%) is in Kalawao County, Hawaii. Counties with high percentages of older adults who purchased their

current home before 1980 are well defined in the Northeast, particularly Pennsylvania, New York, and New England. Mirroring large MSA counties, an additional cluster of counties in southern Louisiana bounding the New Orleans-Metairie MSA is clearly visible.

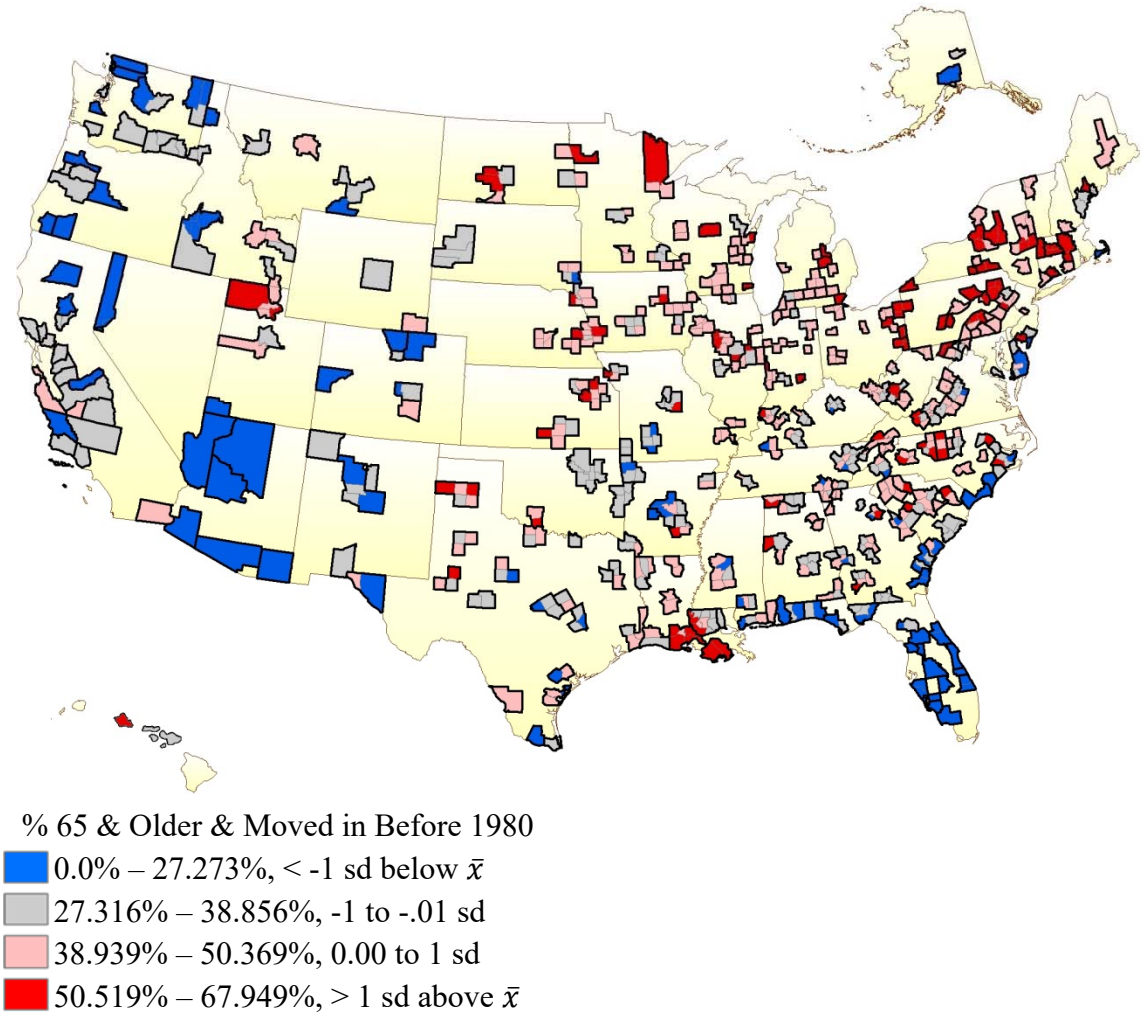

Figure 4.12. Percent 65 and Older that Moved into Their Home Before 1980 by Small/Medium MSA County, 2009-2013 Average. The average ($\bar{x}$) for the 731 Small/Medium MSA counties is 38.87 percent of the population moved into their home before 1980.

The regression analysis describes a positive association between high percentages of older adults who own and have resided in their homes since 1980 and increased FBS employment per 1,000 residents in small and medium MSA counties. Four counties in the small and medium MSA FBS top twenty-five have values over 50 percent for this variable. These counties include Ford County (ranked 5th), Morton County (ranked 16th), Doniphan County (ranked 17th), and Kingman County (ranked 19th), which are all over one standard deviation above the mean.

4.3.4 HCBS Regression Analysis, Small and Medium MSA County

The mean HCBS employment rate per 1,000 residents for counties in small and medium MSAs is slightly higher than in large MSA counties; Home and Community-Based Services are distributed among small and medium metropolitan counties at an average of 5.78 workers per 1,000 residents, compared to 5.41 workers in large metro counties. The mean percentage of the population over 85 years old is higher (1.9) in small and medium metro counties than in large metro counties (1.6) and influences the supply of Long-Term Care services.

As in the previous stepwise regression models discussed in this dissertation, the model aims to determine the most parsimonious model from a selection of variables. The chosen regression model describing employment in Home and Community-Based Services per 1,000 residents by small and medium MSA County explained only 4 percent of the variation based on two predictor variables: number of physicians per 1,000 residents and the percent of the population that is Hispanic **(Model 2, Table 4.13)**. The chosen model describes that for every point increase in the rate of physicians per 1,000

residents, the HCBS employment rate per 1,000 residents will increase by 3.41 points. The model also states that for every point increase in the percentage of the population that identifies as Hispanic, employment in HCBS per 1,000 workers will increase by 0.071points.

Table 4.13. Regression Models Indicating Associations between Independent Variables and the Total Employees in Home and Community-Based Services per 1,000 Residents by Small/Medium Metro County.

	Variable	Model R^2	b	SE b	β	p-value	VIF	CN
Model 1	Constant	0.03	4.031	0.544		0		1
	Physicians per 1K Pop		3.361	0.731	0.173	0	1	3.487
Model 2	Constant	0.044	3.354	0.579		0		1
	Physicians per 1K Pop		3.41	7.27E-01	0.175	0	1	1.991
	% Hispanic		7.10E-02	2.20E-02	0.12	0.001	1	3.99
Model 3	Constant	0.059	-0.027	1.178		0.982		1
	Physicians per 1K Pop		3.468	7.22E-01	0.178	0	1.001	2.242
	% Hispanic		8.50E-02	2.20E-02	0.144	0	1.038	3.819
	%OOMB1980		0.083	2.50E-02	0.124	0.001	1.038	9.463

The extremely low R-Square (0.044) and explanation of the variance illustrates that the predictor variables used in the stepwise regression process were not useful in determining a predictive model for HCBS employment per 1,000 workers for small and medium MSA counties. Health Care Services are meant to mirror local populations, which can make the regression analysis challenging, particularly when examining such a broad geography as the 731 counties that are a part of small and medium MSAs.

The standard estimate indicates that the county measure of physicians per 1,000 residents is the strongest predictor variable in the model, with a 0.175 standardized estimate. The standardized estimate for the percent of the population that is of Hispanic Descendent (0.12) was not as pronounced. A one standard deviation (0.4) increase in the rate of physicians per 1,000 county residents leads to a 0.175 standard deviation or a 1.32 increase in the predicted HCBS employment rate per 1,000 residents, with all other variables held constant. A one standard deviation increase in the percent of population that is Hispanic (12.97) leads to a 0.12 standard deviation or a 0.91 increase in the predicted HCBS employment rate per 1,000 residents, with all other variables held constant.

The percent of owner occupied households consisting of owners 65 and over who moved into their homes before 1980 was the third predictive variable introduced in the stepwise regression model explaining HCBS employment per 1,000 residents for small and medium MSA counties **(Model 3, Table 4.13)**. This model was not chosen due to a negligible increase of 0.015 in the R-Square value. The observed standard estimate for the third predictor variable is 0.124, similar to the other two predictor variables: 0.178 for the rate of county physicians per 1,000 residents and 0.144 for the percentage of the county population that is Hispanic.

The stepwise regression model describing HCBS employment in small and medium MSA counties is not particularly helpful in identifying statistically significant predictive variables. The two predictive variables chosen by the stepwise regression model are consistent with the previous analysis in large MSA counties. As was the case

with the large MSA regression model, the rate of physicians per 1,000 residents was the primary predictor variable. Although physicians, nurse practitioners and other licensed professionals comprise less than 10% of LTC employment (BLS, 2014), a physician-to-population ratio is an established proxy measure of health service availability (Chen and Lowenstein, 1985). The percent of the population claiming Hispanic descent, the second variable chosen in this model, was a negative predictor of FBS employment in large MSA counties. The inverse relationship to FBS employment supports the concept of cultural justification, which describes a preference for familial care or a lack of trust for mainstream institutions and an aversion to formal LTC settings (Min and Barrio, 2009).

The FBS and HCBS LTC employment stepwise regression models used in this dissertation indicated varying associations between predictor variables. Noticeable differences exist between the 436 counties comprising the 52 large MSAs and the 731 counties that make up the remaining 329 small and medium MSAs. While large MSAs are confined to more populated regions of the continental U.S., small and medium MSA counties exist in every state. The mean FBS and HCBS employment rates per 1,000 residents are similar in both MSA categories; however, independent variables show significant range of values. As expected, population density, a representation of urban intensity and social service capacity, is considerably higher in large MSAs over one million residents.

The Cooks D procedure was performed to identify outlier counties that could affect the regression models. Pinellas County, Florida (FBS) and Falls Church city, Virginia (HCBS) were recognized as the most significant outliers in the large MSA

models; the deletion of these counties did not provide a statistically significant change in the regression results for either model. Crocket County, Tennessee and Bedford city, Virginia were identified as outliers in the FBS model; Hampshire County, Massachusetts, was a HCBS outlier for small and medium MSA counties. Separate regression analyses were conducted for the small and medium MSA counties without the outliers, but the results of the models were not found to be significantly different.

4.4 Explanation of Variables Not Used in Regression Analysis

The regression analysis did not use some of the variables that were hypothesized. The following independent variables represent specific population measures, socio-economic factors, and environmental characteristics that did not have the significance that was predicted. The spatial distribution of the percent of Households with Person 65 and Over Living Alone **(Figure 4.13)** was expected to be more significant than the regression model indicated. The percentage of older persons living alone is a good indicator of formal LTC demand, highlighting a particularly vulnerable population and a potential lack of informal family caregiver support. Older adults who live alone are often isolated and face a loss of social connectivity. A decline in mental function and physical mobility present significant obstacles to many older residents wishing to remain in their homes. Planning and community-design studies show that built environments can encourage physical activity and promote cognitive stimulus as well as present substantial impediments to maintaining physical and emotional fitness. HCBS are required most in communities where older adults are living alone in challenging environments.

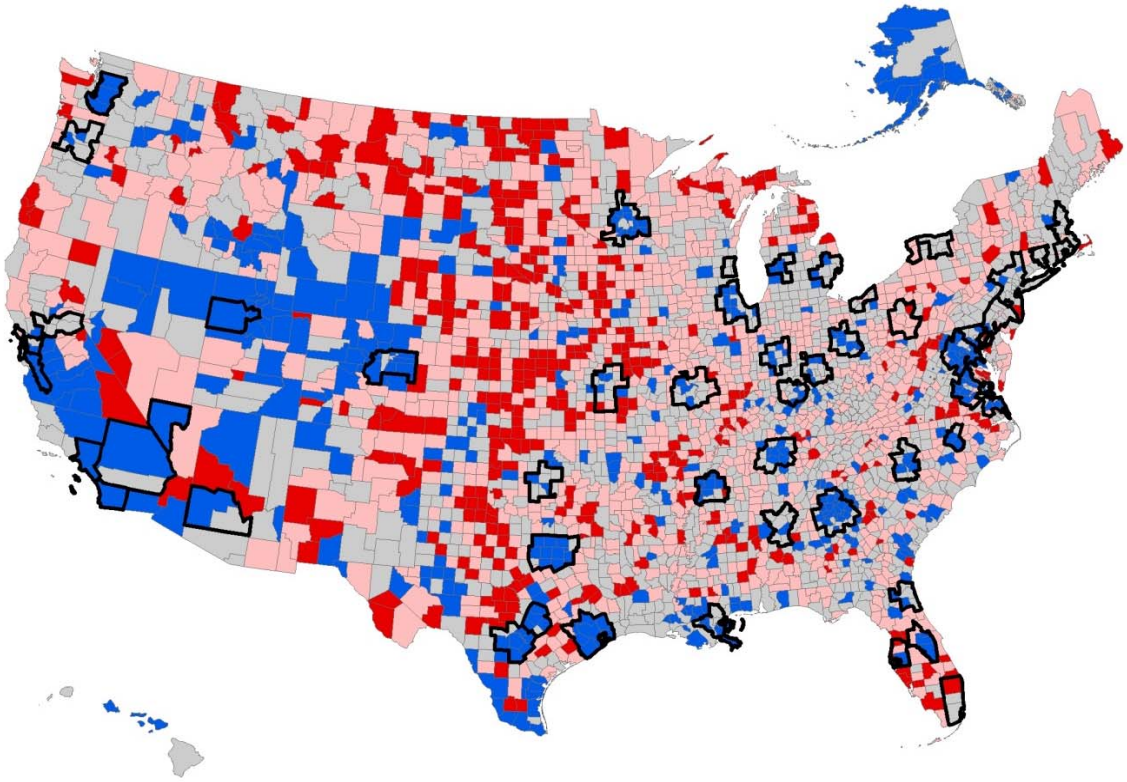

Figure 4.13. Percent 65 and Older and Living Alone by County, 2009-2013 Average. The average ($\bar{x}$) for all counties (n=3,143) in the United States is 11.563% of the population that is 65 or older live alone. Large MSA counties are outlined in black.

The 3,143 counties of the United States are not homogenous, and the percentage of households comprised of individuals 65 or older who live alone is unevenly distributed across the country. On average, 11.6 percent of county households describe an individual 65 or older who lives alone. The largest county percentage of residents who are 65 or older living alone (25.6%) is in Sierra County, New Mexico; the smallest (1.7%) is in

Wade Hampton Census Area, Alaska; both counties are not in MSAs. Kalawao County, Hawaii (21.7%) holds the largest percentage of residents 65 or older living alone in small and medium MSA counties; Ocean County, New Jersey (17%) holds the largest percentage of these residents in large MSA counties. Concentrations of older adults living alone are visible in Florida, mainly attributed to retirement in-migration, and rural areas in the Midwest, largely due to out-migration of younger segments of the population.

The percentage of the population with a college education is an excellent measure of the overall quality of a county's labor market and is important in determining human capital and measuring the strength of a community's knowledge economy. The spatial distribution of educational attainment illustrated by the percentage of each county's population 25 and older that received a bachelor's degree or higher from college **(Figure 4.14)** was expected to be a significant predictor in continuum-of-care employment and AIP opportunity. The relationship between higher education and employment in establishments providing Aging in Community goods and services was not as significant as hypothesized, possibly due to the lack of education required by most Direct-Care employees.

A distinct presence of high percentages of bachelor degrees is located along the eastern seaboard. Distinct clusters are visible in the Atlanta metropolitan area and extend from the Carolinas and southern Virginia through D.C., Philadelphia, New York City, stretching into Boston and New England. The distribution of bachelor's degrees by county is uneven and varies considerably. The average county in the U.S. has a population where 19.8 percent of the residents have a bachelor's degree, varying from a

high of 74.4 percent in Falls Church city, Virginia, to a low of 3.2 percent in Quitman County, Georgia. In addition to the pronounced concentrations of college degrees along the east coast, visible clusters exist in the Denver metropolitan area and along the west coast. These spatial distributions appear to be geographically related to more densely populated counties that are mainly found in large MSAs.

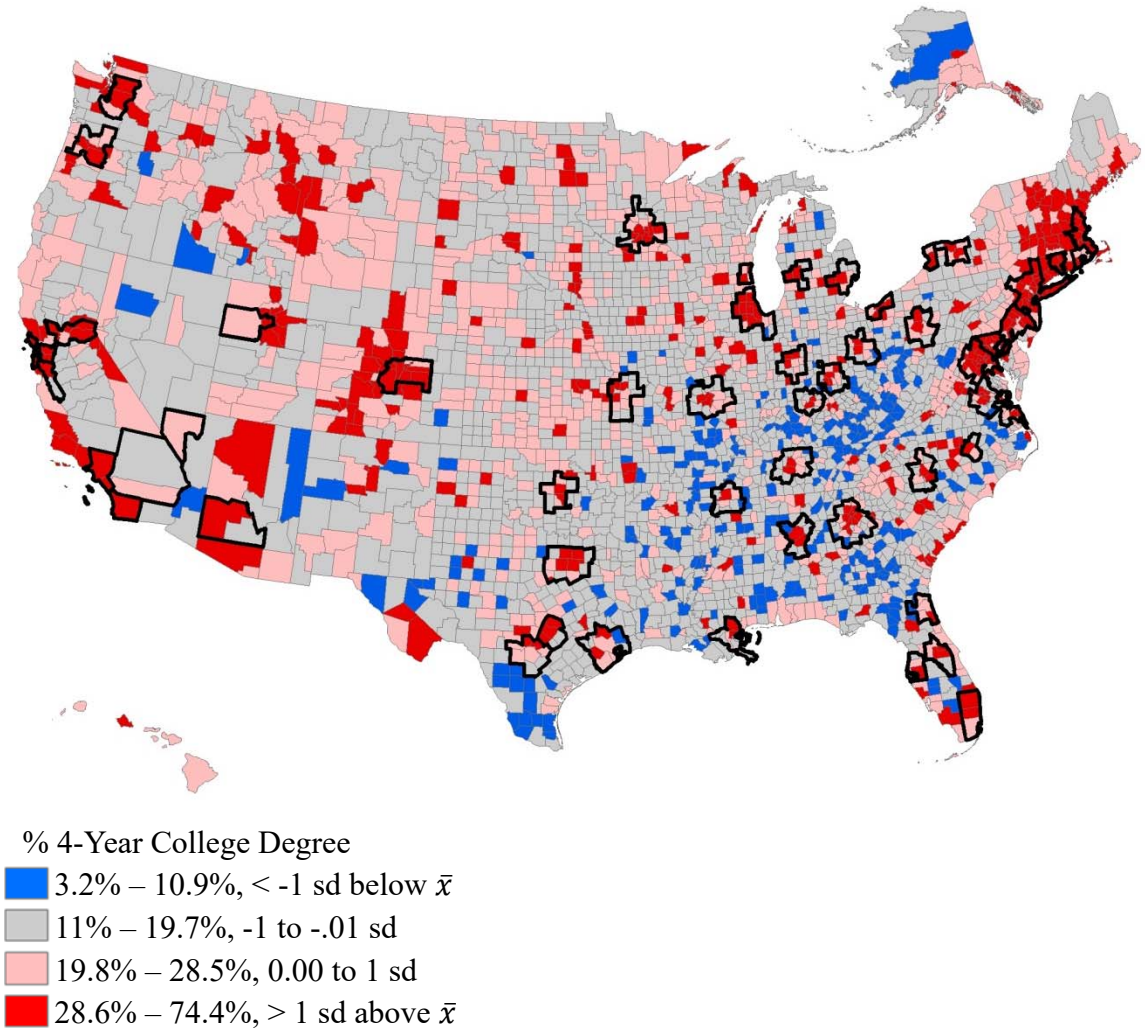

Figure 4.14. Percent 4-Year College Degree by County, 2009-2013 Average.
The average ($\bar{x}$) for all counties (n=3,143) in the United States is 19.762% of the population hold a 4-year college degree. Large MSA counties are outlined in black.

The Petris Social Capital Index (PSCI) measures county social capital levels. This index is derived from the percentage of the population employed in religious and community-based organizations within a county and measures supply-side community social capital (Brown et al., 2006). Establishments that promote social capital encourage aging in community by providing opportunities for residents to connect and share common interests (Thomas and Blanchard, 2009). Social Capital is defined as the resources available to individuals and groups through social connections and social relations with others (Rubinstein, Lubben, and Mintzer, 1994). Avoiding social isolation is one of three central themes in Rowe and Kahn's Successful Aging Model. In-person social networks decrease isolation, the likelihood of institutionalization, and early mortality and increase longevity (Holt-Lunstad, Smith, and Layton, 2010). The spatial distribution of social capital employment **(Figure 4.15)** was anticipated to reflect AIP opportunity, more specifically HCBS employment.

The spatial distribution of PSCI values are unevenly spread among the 3,143 counties in the United States; the average county has a PSCI value of 7.2, varying from a high of 108 in the District of Colombia. The extremely high PSCI value in the nation's capital is largely rooted in the substantial presence of historical museums and cultural activities that are available to the public. There are 18 counties that report no employment in NAICS 813 establishments. U.S. counties with high index values are found in both urban and rural counties. High PSCI values for counties that located outside of metropolitan areas are largely attributed to large concentrations of religious institutions relative to low populations.

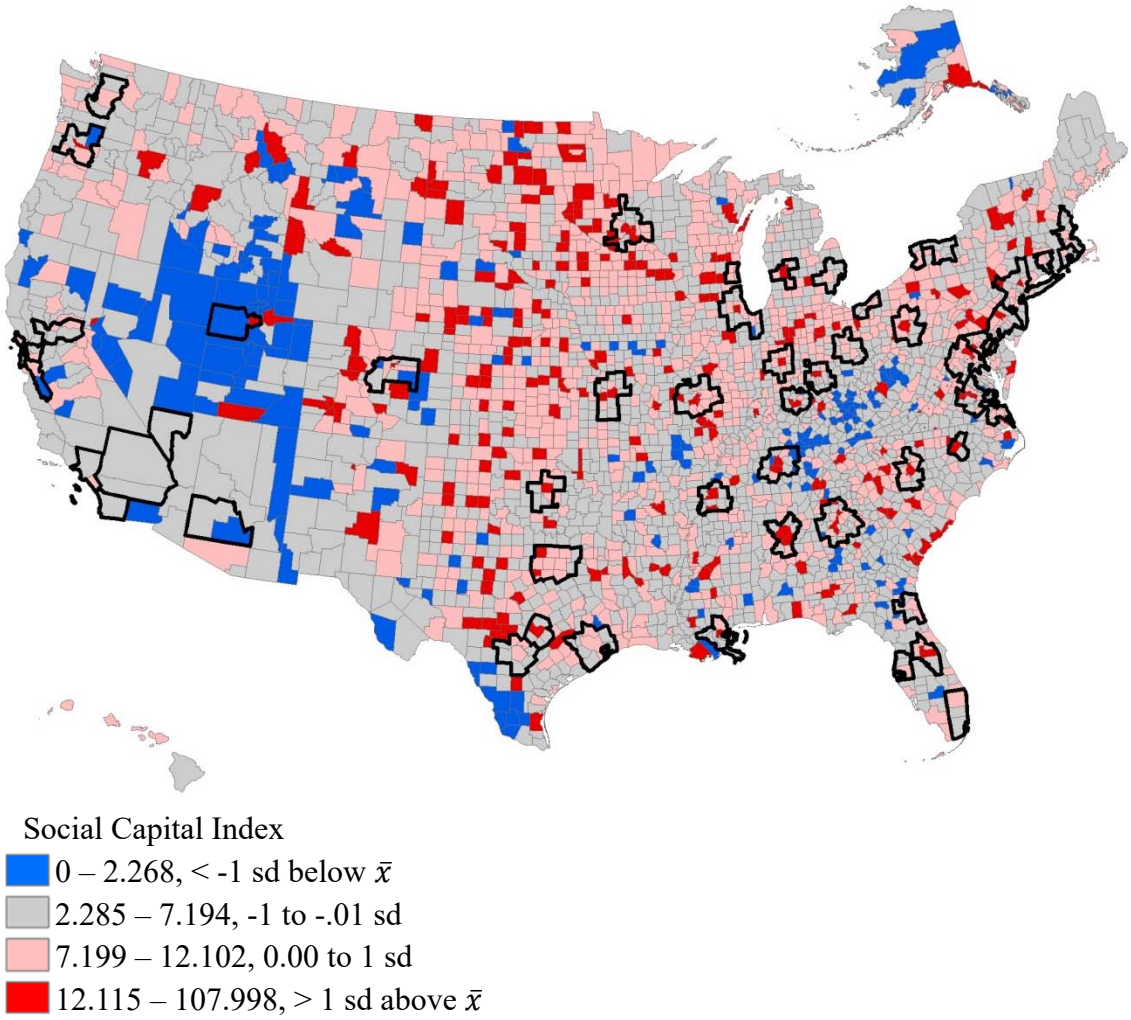

Figure 4.15. Social Capital Index by County, 2009-2013 Average. The average ($\bar{x}$) for all counties (n=3,143) in the United States is 7.196 for a Petris Social Index score. Large MSA counties are outlined in black.

The percentage of a county's population that is part of the Baby Boomer age cohort was expected to indicate AIP opportunity. This variable is linked to percentage of population that is 85 and older because as this population ages, it will influence the demand of LTC. Many Boomers cared for or are currently overseeing the care of their parents in institutional settings; these experiences have fueled a distaste for institutional

care settings. Boomers, instead, are prioritizing quality of life and social interaction and showing a preference to age in community. Additionally, The Informal Caregiver Support Ratio has been impacted by the Baby Boomers' preference for smaller families and fewer children than previous generations. The Baby Boomer generation has expressed itself for decades and continues to provide new and innovative approaches to solving social problems and will certainly look for solutions that will help them age in community and in a self-determined environment. The percentage of Baby Boomers within a county is important to measure future AIP industry needs. It is important to discover how the geography of Baby Boomers is affecting the supply of specific LTC establishments.

The percentage of foreign-born residents is likely an indicator of naturalized citizenship. It was anticipated that this variable would identify relationships between LTC provision and a segment of the population that may possess different cultural views concerning family and aging and may not be aware of, or feel comfortable using formal LTC and AIP services. The predictor variable percent foreign born is similar to the variable percent Hispanic, which was employed in the chosen FBS regression model for large MSA counties. This predictor variable is related to the percent Hispanic and informal caregiver support ratio, which highlights cultural justification, a preference for familial care or a lack of trusts for mainstream institutions.

Home values reflect a region's cost of living and are generally regarded as the most valuable asset a person or family will own. A general indicator of socio-economic status, home values may provide the most accurate measure of wealth for older residents

who may be retired. Though not significant in this statistical analysis, home values are thought to have a positive influence on home-based service consumption. High median home values are spatially concentrated in specific metro areas along the east and west coasts. The large range of home values amongst large MSA counties ($74,000 to $828,100) follows an urban/rural dynamic. Urban counties typically have higher costs of living, and average home values reflect these costs and result in higher wages.

The R-squared values in the chosen regression models are lower than expected. The broad scope of this national county-level statistical analysis makes it difficult to achieve precise findings. There are limitations with the use of public data that may dull the results of the quantitative analysis. Counties with large populations have a wide range of socioeconomic levels, so using the median household income and median home value may not be an accurate representation of socioeconomic status. Even though this dissertation controlled for population by looking at LTC employment per 1,000 county residents, outliers with very small and very large populations could skew the results meant to explain the relationship between AIP employment and the socio-economic variables used in this analysis. Perhaps more importantly, the statistical analysis in this dissertation does not account for state-level public policy decisions and initiatives. Funding for Medicaid, the primary financier of LTC in the United States, varies by state and is largely determined by state-level politics. Specific areas of future research will be described further in Chapter V.

CHAPTER V

CONCLUSION

The purpose of this dissertation was to examine the conceptual evolution of Aging in Place (AIP) and investigate the spatial distribution of AIP opportunity in the United States by emphasizing its relationship with Long-Term Care (LTC) provision. Secondly, this research aimed to determine specific predictor variables that would explain the geographic distribution of LTC establishments, which administer care along a continuum and are comprised of Facility-Based Services (FBS) and Home and Community-Based Services (HCBS). More specifically, this investigation sought to understand the geographic relationship between the direct-care workforce and the continuum-of-care production process. Furthermore, a significant component of this dissertation centered on comparing the differences between key population measures, socio-economic factors, and environmental characteristics that were identified for counties in large MSAs, over one million residents, and for counties in the remaining MSAs.

The FBS and HCBS top twenty-five county rankings for large MSAs include 47 counties that are spread over 23 MSAs (FBS,18; HCBS,14). Although healthcare is mainly considered a local non-basic service, with employment relative to the population of the immediate community, population data stands out in the large MSA top twenty-five rankings. The HCBS top twenty-five counties contain noticeably larger populations. The FBS large MSA rankings did not consist of any counties over one million in

population, while the HCBS rankings show eight counties with over one million residents. Two significant geographic clusters that are strongly related to county population stand out in the large MSA rankings.

The Commonwealth of Virginia is well represented in this investigation. Ten county equivalents, within three MSAs, possess LTC employment rates per 1,000 residents that are included in one of the two LTC top twenty-five rankings. Eight of these county equivalents are independent cities, which may skew county level statistical analysis because they are significantly smaller in geographical size and population than adjacent counties. The City of Fairfax has the highest rate of FBS employment per 1,000 residents, and the City of Falls Church employs the most HCBS workers per 1,000 residents in large MSA counties.

The New York-Newark-Jersey City, NY-NJ-PA MSA contains the most counties of any MSA for either FBS or HCBS classification of LTC establishment; five HCBS top twenty-five counties are in the New York metro area. This fact emphasizes the idea that population density is far more influential in predicting HCBS than FBS employment per 1,000 residents. In addition to large employment rates per 1,000 residents, these New York metro counties possess high levels of absolute HCBS employment.

The 2013 National Center for Health Statistics' (NCHS) Urban–Rural Classification Scheme for Counties designates 68 large MSA counties as central counties; the remaining counties are labeled fringe counties. Median county population, population density, and housing density are about nine to ten times as high among large central counties compared with large fringe counties (Ingram and Franco, 2014). The

classification system is meant to identify health differences across urbanization levels, and residents of large central metro counties generally fare worse in most health measures than those living in large fringe metro counties (Ingram and Franco, 2014). Central large MSA counties are more prominent in the HCBS rankings than the FBS top twenty-five. There are two large central MSA counties in the FBS top twenty-five rankings, while twelve large central MSA counties are in the HCBS top twenty-five rankings.

There are more small and medium MSAs than large MSAs, and they generally contain fewer counties; the two top twenty-five rankings for small and medium MSA counties are and less concentrated and are dispersed among 45 metro areas. The employment rates per 1,000 residents are similar to those found in the large MSA county rankings, with a few large outliers. Like large MSA county rankings, Virginia's political structure is responsible for the most county equivalents; five independent cities are included in the small and medium MSA county top twenty-five.

The stepwise regression model identified population measures, socio-economic factors, and environmental characteristics that influence continuum-of-care service provision. The statistical analysis recognized the ICSR as the most significant predictor variable for FBS employment in large MSA counties. The negative relationship described in the model is consistent with the research hypothesis and literature review. Informal caregivers are an essential component of AIP opportunity and provide the majority of LTC. Low ICSR values indicate an informal care gap and a likely need for formal continuum-of-care resources. These locations are most visible in "rust belt" areas

that have experienced population decline and Florida, which continues to attract a high volume of retirement in-migration.

The most influential predictor variable chosen by the regression model illustrating HCBS employment in large MSA counties is the number of physicians per 1,000 residents. The positive relationship between physicians and HCBS provision was expected and is consistent with the idea that physician ratios generally reflect medical capacity (Chen and Lowenstein, 1985). Counties with high rates of physicians per 1,000 residents are found in most large MSAs and are particularly visible in central counties.

The regression analysis indicated the percentage of the population 85 and older as the most significant variable to predict FBS employment per 1,000 residents in small and medium MSA counties. The strength of the predictor variable was consistent with the review of the literature, and the fact that this predictor variable was not chosen in the FBS regression model for large MSA counties was not expected. Large concentrations of older adults are thought to increase LTC demand. An extremely low R-Square (0.044) was not useful in creating a predictive model for HCBS employment in small and medium MSA counties.

There are significant geographical differences between counties comprising large MSAs and those that make up small and medium MSAs. While large MSAs are confined to more populated regions of the continental U.S., small and medium MSA counties exist in all fifty States. FBS and HCBS employment rates per 1,000 residents are similar in both MSA categories; however, independent variables show substantial variation and

range. As expected, population density, a representation of urban intensity and social service capacity, is considerably higher in large MSAs over one million residents.

This dissertation explored the broadening definition of AIP to include Aging in Community (AIC). A key component of the expansion is the shift towards a self-determined environment. A self-determined environment is predicated on choice and the availability of LTC resources, including institutional and non-institutional care facilities, or care provided in a home-based setting (Ball et al., 2004; Bernard, Zimmerman and Eckert, 2001). Adequate continuum-of-care resources afford older adults the opportunity to remain active members of their community, either by remaining at a long-time home, or transitioning to a setting within the greater community that provides a more appropriate level of care. Aging in Place within a planned community or facility setting is becoming more prevalent (Thomas and Blanchard, 2009).

These findings warrant in-depth studies on disparities in access to care. Geography should not determine whether people who need LTC have choices for affordable, high-quality continuum-of-care services. Residents throughout the United States deserve to benefit from public policy that supports the ability of older people to age in homes and communities of their choosing. Older residents must remain integrated with the community, where they can maintain social connections and contribute to society. A critical geographic perspective is well suited to address the spatial distribution of LTC employment and AIP opportunity, and highlight issues of equality/inequality and exclusion/inclusion (Kearns and Moon, 2002).

This dissertation is a first step towards understanding the fundamental geographic patterns at play regarding the spatial distribution of specific Aging in Place opportunities in the United States by focusing on the requisite relationship between AIP and Long-Term Care provision. The analysis revealed that Long-Term Care employment and Continuum of Care establishments are not evenly distributed throughout the United States, greatly influencing an individual's ability to Age in Community. This is one of the first national comprehensive spatial examinations of the continuum-of-care production system within the United States, and is a necessary first step in identifying future lines of inquiry to be explored in further detail.

A more detailed investigation that examines the relationship between MSA counties and the MSA as whole is necessary to fully understand the geography of the continuum-of-care production process at the metropolitan level. Public policy crafted at the state level plays a large role in determining the settings of continuum-of-care goods and services. Medicaid is the main financial source of LTC expenses in the United States; eligibility and programs vary by state. An investigation of Aging in Community and LTC resources of counties at the state level would allow for more specific comparisons of counties and likely produce more statistically significant results.

Future research can focus on the spatial distribution of older adults and aging population among different regions and examine how regional economic, social, and cultural factors shape continuum-of-care systems at the local level. Studies concerning the geography of the LTC workforce and its role in promoting AIP are urgently needed to assist researchers and policy makers with challenges resulting from population aging and

increasing demands for LTC in the United States. Although where one lives should not determine access to continuum-of-care services, AIP opportunity enjoys a close relationship with geography.

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APPENDIX A

ACRONYMS

Activities of Daily Living	ADLs)
Aging in Community	AIC)
Aging in Place	(AIP)
American Association of Retired Persons	(AARP)
American Community Survey	(ACS)
American Health Care Association	(AHCA)
Area Agencies on Aging	(AAAs)
Area Health Resources Files	(AHRF)
Assisted Living	(AL)
Certified Aging in Place Specialist	(CAPS)
Continuing Care Accreditation Commission	(CCAC)
Continuing Care Retirement Communities	(CCRCs)
County Business Patterns	(CBP)
Department of Health and Human Services	(DHHS)
Facility-Based Services	(FBS)
Home and Community-Based Services	(HCBS)
Informal Caregiver Support Ratio	(ICSR)
Instrumental Activities of Daily Living	(IADLs)
Long-Term Care	(LTC)
Long-Term Services and Supports	(LTSS)
Metropolitan Area Agency on Aging	(MAAA)
Metropolitan Statistical Areas	(MSAs)
Modifiable Area Unit Problem	(MAUP)
National Association of Home Builders	(NAHB)
National Center for Health Statistics	(NCHS)
National Center for Health Workforce Analysis	(NCHWA)
Naturally Occurring Retirement Communities	(NORCS)
New York City Department for the Aging	(DFTA)
NORC Supportive Service Programs	(NORC SSPs)
North American Industry Classification System	(NAICS)
Office of Management and Budget	(OMB)
Petris Social Capital Index	(PSCI)
Professional Healthcare Institute	(PHI)
Program of All-Inclusive Care for the Elderly	(PACE)

Residential Care Facilities	(RCFs)
Service Enriched Housing	(SEH)
Skilled Nursing Facilities	(SNFs)
Standard Industrial Classification	(SIC)
University Based Retirement Communities	(UBRCs)
Variance Inflation Factor	(VIF)
World Health Organization	(WHO)